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TREATMENT OF PHOSPHORUS BURNS*

(WITH A NOTE ON ACUTE PHOSPHORUS POISONING)

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INTRODUCTION: This outline is based upon information obtained from the British War Office, the British Ministry of Home Security and other official sources; experiences in the laboratories of the Imperial Chemical Industries Ltd., the Crookes Laboratories and others[1] and the writer's experiences with air raid precautionary measures in England and chemical warfare and toxicological research in general. The series of publications on air raid precautionary measures, of which this is one, aim at giving the best available information and will be revised from time to time in the light of future developments.

TYPES OF PHOSPHORUS

Phosphorus is probably too active to occur in the free state in nature. It is obtained on a commercial scale by treating naturally occurring compounds of phosphorus (calcium phosphate, etc.). Like sulphur, it exists in allotropic forms, and there are at least five types—red, scarlet red, violet, black and white. The two common forms are the red and white, and the contrast in their appearance and other properties is so great that a casual observer would hardly suppose that they are the same element. Since red phosphorus does not possess any of the properties with which this paper is concerned—the capacity to burn and poison—the following observations refer to white phosphorus only.[2]

Occurrence. — In peace-time, phosphorus is used in a number of industries, pyrotechnical, alloys, etc. In war, it serves a variety of purposes. It is a very efficient material for generating smoke screens and, because of its incendiary properties, it is used in small arms incendiary bullets, in hand and rifle grenades, in artillery incendiary shells, in trench mortar bombs and in bombs dropped from aeroplanes, etc. A marked increase of phosphorus burns may, therefore, be expected as the war progresses. Phosphorus is also employed in "tracer" bullets and, recently, has been incorporated by the Germans into the .312 Mauser machine gun bullets in sufficient quantities to cause death, and, in fact, has caused death, from acute phosphorus poisoning.

Chemical and physical properties.[3] — White phosphorus, when pure, is a translucent, lustrous solid of waxy consistency, soft at ordinary temperatures and brittle when cold, and has a strong odour of matches. It is about twice as heavy as water (specific gravity = 1.8) and melts at 44.2° C. (112° F.), that is, at a temperature of very warm water. It is almost insoluble in water, soluble in oils and very soluble in carbon disulphide. Solutions of phosphorus in carbon disulphide form explosive mixtures with air at ordinary temperatures, and the finely divided phosphorus which is left on evaporation of the carbon disulphide ignites spontaneously. Phosphorus is soluble in a variety of other organic solvents, some of which are also highly inflammable. Some of these solvents also dissolve rubber and thus make possible the preparation of phosphorus-rubber incendiary mixtures.

Phosphorus unites readily with oxygen in

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1. *Brit. M. J.*, 1941, **2**: 428; *ibid.*, 1942, **1**: 433; *ibid.*, **2**: 244, 644, 767; *ibid.*, 1943, **1**: 111, 128.

2. Red phosphorus does not ignite in air below 240° C. (464° F.) and, as a poison it is relatively inert.

3. This description is confined to chemical and physical properties which are of clinical importance.

the air and produces phosphorus pentoxide[4]

$$4\ P + 5\ O_2 = {}_2P_2O_5.$$

The oxidation is accompanied by evolution of light, although the temperature is not such as is usually associated with incandescence. Phosphorus thus becomes luminous in the dark. As will be seen later, this is taken advantage of in the treatment of phosphorus burns. The luminescence is usually pale green or faint bluish in colour. In warm air (35° C.), the oxidation takes place with such energy that the element bursts into a yellow flame (hence its use in tracer bullets) and produces a dense white smoke.[5]

Burning phosphorus is easily extinguished with water, but *re-ignites on drying*. For this reason materials contaminated with phosphorus during air raids must be kept wet until the phosphorus has been removed.

The oxides of phosphorus unite with water to form acids. $P_2O_5 + 3\,H_2O = {}_2H_3PO_4$ (phosphoric acid). $P_2O_3 + 3\,H_2O = {}_2H_3PO_3$ (phosphorous acid), etc.

Phosphorus unites directly with metals to form phosphides. For example, when placed in solutions of copper salts, it forms non-igniting black copper phosphide. The ratio of copper to phosphorus in the compound is, however, constant under certain carefully regulated conditions only. During this reaction, various phosphorus and other acids are produced. Thus, if copper sulphate is used to stop the ignition of the phosphorus, sulphuric acid is produced, in addition to the phosphorus acids and thus adds to the acidity of the mixture.

Pathology. — When phosphorus comes into contact with skin and is allowed to burn, it produces almost immediately a greyish discoloration of the affected part. The initial pain is very severe and in severity the burns approach those produced by hydrofluoric acid and, thus are more severe than those produced by caustic soda, sulphuric acids or other acids. The phosphorus tends to imbed itself in the skin and the phosphorus acids produced tend to penetrate still deeper. Blisters are, however, rare. Phosphorus burns suppurate more than ordinary burns and heal slowly (3 to 4 weeks or more). The danger of infection is thus correspondingly increased. The scars of the healed burns tend to be thin and atrophic.

White phosphorus is exceedingly poisonous (see later). Even the vapours are dangerous.

First Aid Treatment of Phosphorus Burns

The treatment in the field is based upon the melting point of phosphorus and the fact that, while burning, phosphorus gives off phosphoric acid which itself causes the skin to burn. At the first aid post advantage is taken of the interaction between copper and phosphorus to form non-igniting black copper phosphide. Briefly, the instructions to first aid personnel are as follows:

(*a*) ***In the field.***—Remove contaminated clothing at once (cut it off, if necessary) and flush the affected parts of the skin with *warm* (but not hot) water. Remove visible particles of phosphorus with a *forceps* while the skin is being flushed, taking care to remove *every* particle possible. Then apply a thick pad soaked in warm water. (The warm water, by melting the phosphorus, will remove phosphorus particles which have imbedded themselves in, and are adhering to, the skin more effectively than forceps. The water also dilutes the phosphorus acids produced and thus renders them less harmful.)

If the burns are extensive, evacuate the casualty to a hospital at once. If the burns are small, evacuate the casualty to the nearest first aid post.

(*b*) ***At the first aid post.***—Flush the affected parts with a *warm* solution of baking soda or washing soda (made by adding two tablespoonfuls of the soda to a pint of warm water). (Thorough alkalinization of the affected area neutralizes the phosphorus acids and thus renders them harmless.) Then wash the last traces of phosphorus away with a 1% solution of copper sulphate and, with *forceps,* remove any dark-coloured (blackened) particles noted. Finally, wash the affected parts with water containing a little of any antiseptic solution and apply a sterile dressing.

NOTE: First aid personnel should be warned not to use oily or greasy dressings, since they do not possess the necessary facilities to determine whether all of the fragments of phosphorus have been removed. By dissolving the phosphorus oils and greases may assist its penetration into the deeper tissues and thus increase the depth and severity of the burn.

4. In the presence of a restricted supply of air, phosphorus trioxide (P_2O_3) is formed.

5. A phosphorus bomb is recognized by the smell and the dense white smoke which it produces.

MEDICAL TREATMENT OF PHOSPHORUS BURNS

The first aid treatment described aims at simplicity and speed, and very little other treatment will be necessary in the majority of cases, if the burns are small, few in number and have been produced by phosphorus in a form which can be readily attacked with water and aqueous solutions of copper sulphate.

Consideration must, however, be given to all forms of phosphorus which may be met with in war time. These include (*a*) phosphorus in a variety of organic solvents; (*b*) phosphorus-oil preparations, and (*c*) mixtures of phosphorus and rubber. In burns produced by such preparations flushing of the affected parts with water, aqueous solutions of sodium carbonate or sodium bicarbonate and aqueous solutions of copper salts may not be very effective owing to the immiscibility of these organic solvents and oils with water. The effectiveness of such treatment will be still less in cases of highly viscous mixtures of phosphorus and rubber. Attempts have, therefore, been made to prepare inactivating agents to meet such conditions, and the preparation developed in the Imperial Chemical Industries, Ltd., appears to be the most satisfactory. It is an oily preparation and contains a copper compound which converts phosphorus into non-igniting copper phosphide. The organic solvent which it contains not only dissolves the copper compound and oils but also rubber. The whole preparation, therefore, is readily miscible with organic solvents, oils and rubber and thus allows intimate contact of the inactivating copper with phosphorus either in organic solvents or in oils or in solutions of rubber. The copper thus reacts progressively with the phosphorus in such solutions, not merely inactivating the surface by coating it with copper phosphide.

The authors of this formula have shown that when phosphorus, in solution of carbon disulphide, is applied to skin and allowed to ignite after evaporation of the disulphide, it is immediately extinguished by this oil-soluble copper preparation and the inactivation of the phosphorus begins almost at once. Since the preparation is easily emulsified with water it can bring about intimate contact of the copper with phosphorus even in highly viscous mixtures of phosphorus and rubber. Also, as the authors state, since the preparation contains its own emulsifying agent, it is completely removed from the skin by water, carrying with it any oil or rubber that may have been associated with the phosphorus, as well as the detritus from the inactivating reaction. The skin is left almost entirely clean and unstained. Its composition is as follows:

Copper oleate	25 grams
Trichlorethylene	35 "
Turkey-red oil[6]	25 "
"Surgical spirit"[7]	15 "

The copper oleate is dissolved in the trichlorethylene. The Turkey-red oil is then incorporated into the mixture and the alcohol[8] is added to the final mixture. The final solution is deep blue-green in colour and perfectly homogeneous. It is readily prepared.

I have tested this preparation with a variety of phosphorus-oil, phosphorus-rubber and phosphorus-oil-rubber compositions, prepared with suitable solvents and which ranged in viscosity from thin liquids to the highly viscous rubber "cements" and found it effective in practically all cases.

DETAILS OF TREATMENT

STAGE 1

If the first aid treatment described has not as yet been carried out, the preliminary measures—rapid removal of clothing (if necessary) and flooding of the affected parts of the skin with warm water (over 112° F.)—are the same. The next procedure (Stage 2) depends upon the availability of the different inactivating agents. Thus:

STAGE 2

(*a*) *Sodium carbonate or bicarbonate only available.*—If neither the aqueous solution of copper sulphate nor the oil-soluble copper reagent is available, the affected parts should be washed[9] with warm sodium bicarbonate or sodium carbonate solution (made by adding 2 tablespoonfuls of the dry product to a pint of water).[10] The affected area should then be searched carefully in the dark for luminous particles of phosphorus, which should be re-

6. Sulphonated castor oil, 70% ammonia-finished.
7. Methylated spirit, unpyridinized, containing one-half ounce castor oil and 1 3/5 drachms boric acid to a pint.
8. The alcohol is essential in cases of compositions containing rubber.
9. Swabs must be wetted with the solution. Liquids suspected of containing phosphorus must not be dabbed with dry materials.
10. Experiences with industrial accidents in the past have shown that the essential feature of all forms of treatment is the *immediate* flooding of the area with warm water and thorough alkalinization.

moved with a forceps. The skin should then, again, be washed with the alkaline solution and again examined for luminous particles, and the whole process should be repeated until the affected area is clean. The affected parts should then be soaked for a prolonged period in the warm alkaline solution (about one-half hour if the burns are small and one to two hours in the case of large burns). The subsequent treatment is as for chemical burns in general (see Stages 3 and 4).

(*b*) *Alkaline powder mixture available.*—The alkaline powder mixture developed in the Crookes Laboratories, if available, is superior to sodium bicarbonate or sodium carbonate solutions, because of its greater alkalinity and its emulsifying properties. By its emulsifying action, it facilitates the break-up of the phosphorus globules and thus permits their more rapid inactivation. It consists of the following:

Magnesium oxide (heavy)	10 parts
Borax	5 "
Sodium bicarbonate	85 "

After having extinguished the burning phosphorus with warm water, the powder is sprinkled on the wet surface and, if necessary, more water is added, and the powder is worked up to a medium thick paste. It is then washed or wiped off and reapplied so long as marked effervescence continues. A medium thick paste is then again applied, covered with a bandage and kept damp (about one-half hour if the burns are small and one to two hours in the case of large burns). The subsequent treatment is as for chemical burns in general (see Stages 3 and 4).

(*c*) *Copper sulphate available.*—If an aqueous solution of copper sulphate is the only copper preparation available, the affected area should be washed with it immediately after the first alkaline treatment and the removal of the luminous particles in the dark described above. A very careful search should then be made for any blackened particles of copper phosphide[11] which should be removed. The affected parts should then be soaked for a prolonged period in warm sodium bicarbonate (about one-half hour if the burns are small and one to two hours in the case of large burns). If the alkaline powder is available it should be used as described instead of the prolonged soaking. The subsequent treatment is as for chemical burns in general (see Stages 3 and 4).

(*d*) *Oil-soluble copper preparation available.*—If the oil-soluble copper reagent is available, it should be applied to the affected area immediately after the preliminary flooding of the affected parts with warm water, by swabbing, pouring or by actual immersion of the affected parts, as the circumstances require.

NOTE: If the burns are widely scattered and cannot be treated at the same time with the oil-soluble copper reagent, the untreated parts must be kept *wet* until they can be treated.

In general, inactivation of the phosphorus will take place in from a few seconds to one or two minutes. When the inactivation has been well established, the affected areas should be washed with tepid water and all of the contaminated material should be swabbed off. The whole area should then be thoroughly alkalinized with sodium bicarbonate paste as described above.

STAGE 3

After the skin has been finally alkalinized by any one of the methods described it may be dressed daily with a 1:1,000 acriflavin emulsion or treated with some other antiseptic, but the following points are to be noted:

(*a*) Acriflavin emulsions might produce skin eruptions. Therefore, if they are used, the affected area should be examined daily and the emulsion should be discontinued immediately after any eruption is noticed.

(*b*) "Sulpho" pastes and emulsions appear to be satisfactory, but they also might produce skin eruptions and should be discontinued as soon as any eruption is noted.

(*c*) Tannic acid and other coagulants (picric acid, etc.) are *not* satisfactory since, as in the case of all other acid burns, they might seal acid products and thus delay healing.

STAGE 4

Immediately healing begins (7 to 10 days), the affected area may be dressed with a boric ointment which provides a satisfactory dressing until the scar produced is sound. Ultra-

11. It is necessary to flush the affected parts thoroughly with warm water or warm alkaline solutions *before* the copper sulphate solution is applied, since, aside from the value of this form of treatment alone, the amount of phosphorus which can be inactivated by this method is small. The primary purpose of the copper sulphate is to destroy minute particles of phosphorus and to make obvious by blackening (formation of copper phosphide) the larger pieces so that they must be removed mechanically.

violet light radiation tends to reduce the great pain of skin lesions produced by phosphorus and also tends to promote rapid healing.

TREATMENT OF BURNS NEAR THE EYES

The simplest and safest procedure is to wash the parts well with warm water and apply a mask of lint soaked in sodium bicarbonate solution. The alkaline solution should be repeated every four hours. (The alkaline treatment must be thorough and the dressing must not be allowed to dry.)

TREATMENT OF INTERNAL INJURIES PRODUCED BY PHOSPHORUS-CONTAINING BULLETS

A careful search should be made for phosphorus diffusely implanted in tissues by looking for (*a*) fumes; (*b*) the characteristic odour of phosphorus, and (*c*) luminescence, and the affected parts should be washed thoroughly with warm water or, where permissible, warm solutions of sodium bicarbonate followed, if necessary, by warm water.

Where permissible, advantage should also be taken of very weak solutions of copper sulphate to inactivate the phosphorus. (NOTE: Copper sulphate is a poison. When taken in solution by mouth, it acts as an emetic. Most of it is thus lost by the energetic vomiting which ensues; but as little as 6 to 8 grains of absorbed copper sulphate have been reported as fatal.)

As the authors of the formula point out, owing to the high content of trichlorethylene,[12] the oil-soluble copper reagent precludes its use for internal injuries produced by phosphorus-containing bullets.

A NOTE ON ACUTE PHOSPHORUS POISONING

Lethal dose.—White phosphorus is very poisonous when taken by mouth and, at one time, was a common form of poisoning, owing to its use in the manufacture of matches; this is now generally forbidden.[13] As little as 2 mgm. (the amount which was then generally used in the head of a match) is known to have caused the death of an infant; 3 mgm. caused the death of a child 2 years old, and the lethal dose in an adult is between 1 and 2 grains, though there have been cases of recovery following ingestion of 5 and 6 grains. Under air raid conditions, therefore, consideration will have to be given to the possibility of accidental poisoning of food from flying fragments of phosphorus bombs. The vapours of white phosphorus are also poisonous and, as stated, consideration must now be given to acute poisoning from phosphorus-containing bullets.

Signs and symptoms.—The signs and symptoms depend upon (*a*) whether the phosphorus has been taken by mouth or (*b*) whether it has entered the body elsewhere, as by means of a phosphorus-containing bullet.

In the case of ingested phosphorus, there are two phases, namely, (*a*) primary and (*b*) secondary. The signs and symptoms of the primary phase are due to local irritation of the stomach and intestines. The signs and symptoms of the secondary phase are due to the phosphorus which has been absorbed.

The early signs and symptoms may appear almost at once. The usual interval is 2 to 6 hours but, in rare cases, there may be a delay of 12 to 48 hours. They consist of a burning sensation in the throat, severe pain in the epigastrium, intense thirst, eructations of gas with a distinctive garlic-like odour, and vomiting, which may be very intense. The vomitus is dark green, black or coffee-coloured and may be luminous in the dark. The breath may also be luminous on account of small particles of phosphorus adhering to the mucous membrane of the mouth. Purgation may or may not occur. It is not common, but may be very severe and the fæces may also be luminous in the dark. The nervous and muscular debility is intense and death may occur from collapse or during a fit of convulsions within an hour. The fatal period may, however, be two and three weeks and more; but the average period is about five days.

Following the acute stage, which in most cases does not last longer than one to two days, there is usually an abatement of the signs and symptoms with a period of comparative comfort, except for general malaise. This period may vary from a few days to a few weeks. The secondary phase may, however, follow the first almost immediately. It is usually ushered in

12. Trichlorethylene is a powerful narcotic. The fatal dose is about 2½ times only the dose necessary to produce acute narcosis. Like chloroform, it invariably causes death if the exposure to it is long enough and in high enough concentration. (Report No. 80. Toxicology of Industrial Organic Solvents. British Medical Research Council. Industrial Health Research Board.)

13. Recipes for matches have been the subject of numerous patents. The phosphorus is, however, now of the red form. In safety matches, the phosphorus is on the rough side of the match-box, mixed with powdered glass, sand or emery and glue. The combustible is on the head of the match and generally consists of antimony sulphide mixed with potassium dichromate or some other solid oxidizing agent. When the match is struck, the friction changes a little of the red phosphorus to the white form which ignites readily.

by headache, great weakness, vomiting and diarrhœa; but the striking features at this stage are (*a*) jaundice and (*b*) a marked tendency towards hæmorrhages in the skin and all mucous membranes, throat, bladder, uterus, vagina, etc. The abdomen becomes distended. The liver generally enlarges and becomes painful. The urine becomes scanty, is highly coloured and, in addition to bile pigments, albumin, blood and casts, may contain free fat globules. Though the pulse may be normal at first, it becomes progressively more rapid and weak as the prostration progresses. The respirations become rapid and shallow and death usually occurs in about 5 days. In cases of longer duration, the liver may decrease in size towards the end, and death occurs from failure of liver function as in acute yellow atrophy. Though rare, cases have however been known to recover from this stage.

Post mortem appearances.—When death occurs within 24 hours, the findings are essentially those of a highly irritant poison with extensive destruction of the coats of the stomach by softening, ulceration and possibly perforation. On opening the stomach, white vapours may be noted. The garlic-like odour is generally marked and the stomach lining and contents exhibit luminescence. The mucous membrane may be inflamed or greyish-coloured due to cloudy swelling and fatty degeneration of the epithelium. If two days have elapsed since the ingestion of the phosphorus, the degeneration of the large glandular organs and heart muscle is generally well developed. If three or more days have elapsed, the picture is usually characteristic. The skin is yellow and contains petechiæ. Petechiæ may also be present in the pleura, pericardium and mesentery. In the female, hæmatomata may be found in the ovaries and uterus. The soft organs show icteric discoloration and a high degree of fatty degeneration, as do also the muscles, including the heart muscle. The liver is practically always enlarged, has a saffron-yellow colour with red spots, and has a pulpy consistency. On section, the surface is very greasy, and though the colour is usually of a uniform yellow tint, it may be "marbled" from the presence of unaltered liver tissue. On microscopic examination, there is the typical picture of fatty degeneration. The fat globules found in the Kupffer cells appear to be an early manifestation. Degenerative changes and hæmorrhagic areas may be found in the brain and spinal cord. When death occurs after a prolonged secondary phase, the stomach may actually appear normal. Putrefaction supervenes rapidly after death.

TREATMENT

Under no circumstances should oily or fatty materials, such as milk, be administered to alleviate the gastric irritation, as these aid absorption of phosphorus.

Copper sulphate should *not* be used as an emetic, though some of it might convert the phosphorus into non-igniting copper phosphide. Aside from possibly adding to the irritation of the stomach, there is a danger of some of the copper sulphate being absorbed owing to destruction of the gastric mucosa.

Prompt lavage of the stomach with warm potassium permanganate solution (about 3 grains to the pint) is the safest inactivating agent.[14] It oxidizes the phosphorus, and the phosphorus acids produced are rendered harmless by dilution. *The irrigation should be continued until the colour of the returned liquid remains unchanged.* Quarts of the solution may be required, if the stomach contains food. After the irrigation, the stomach should be washed well with warm water and Epsom salts should be left in the stomach to promote catharsis.[15] The dose should be repeated as often as required, to encourage elimination, for several days. If diarrhœa has occurred, the bowels should be flushed with the warm dilute potassium permanganate solution.

Diuresis should be encouraged by repeated intravenous injection of a 5% solution of glucose. This will also tend to decrease the danger of hypoglycæmia, and tend towards storage of glycogen in the liver and thus tend to reduce the degree of fatty degeneration. If necessary, morphine should be given to relieve the pain. Sodium bicarbonate should be administered to combat the acidosis, which may be severe owing to the phosphorous acids formed. A level teaspoonful (about 5 grams) in a half glassful of water should be given every half hour until the urine becomes alkaline or until the person has received about 0.5 grams per kilogram of body weight. If the alkali is not tolerated by mouth, a litre of a 3% solution may be given intravenously. Further treatment is symptomatic.

14. Care must be taken to dissolve the crystals of potassium permanganate completely. Solid potassium permanganate is a *corrosive*.

15. Phosphorus may be found in the fæces as long as a week or more.

ESSENTIAL FEATURES CONCERNING THE PROPER NUTRITION OF THE INFANT AND CHILD*

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CONSIDERABLE work has been done in the Department of Pædiatrics, University of Toronto, on the study of the nutritional requirements of the normal child. It is our belief that the proper supervision of the child's nutrition is one of the most effective means for the maintenance of good health. It should not be assumed that we neglect other factors such as the supervision of hours of sleep, and the amount of exercise, fresh air and sunshine obtained, and the treatment or removal of foci of infection. But of all the means at the disposal of the present-day physician who is interested in preventive pædiatrics none gives greater health dividends than the proper supervision of the nutritional requirements of the child.

Ebbs,[1] of our department, has recently shown that the progress of an infant during its first six months of life is greatly affected by the diet of the mother during the prenatal period. In this extensive study, which was carried on in collaboration with the Department of Obstetrics of the University of Toronto, the prospective mothers were interviewed three or four months before term. They were instructed to keep an accurate record of all the food that they ate for a week. This was carefully checked over by a dietitian and on the basis of these records the women were divided into two groups—those on poor diets and those on good. Half of the mothers on the poor diets were provided with the following supplementary foods daily: 30 ounces of milk; 1 ounce of cheese; 1 egg; 1 orange; 4½ ounces of tinned tomatoes; 2 tablespoons of a special preparation of wheat germ which contained added iron (about 6 mgm. per tablespoon) and a capsule containing 2,000 I.U. of vitamin D in the form of viosterol. Capsules containing plain corn oil were given to the mothers on the poor diet, in order to avoid any psychological effect. The mothers given the supplementary food developed much fewer and less severe complications during the prenatal period and during labour and the succeeding six weeks than those remaining on their usual poor diet. Eighty-six per cent of the mothers given the supplementary food were nursing their infants six weeks post partum, whereas only 59% of the mothers on the poor diet were able to do so.

The comparison of the records of the infants during the first six months of life is equally impressive. Those of the mothers eating the poor diet showed a much higher incidence of respiratory infections (colds, bronchitis and pneumonia), rickets, tetany, dystrophy and anæmia. In fact, none of the infants of the mothers on the supplemented diet developed either rickets or tetany. The provision of an adequate food supply for the child even before birth is therefore very important.

The problem of the normal child's nutrition has expanded far beyond the simple questions of the caloric intake, protein requirement and the ratio of fat to carbohydrate. Our feeding problems with infants which formerly engaged so much of our attention have now been largely solved by the feeding of proper concentrations of pasteurized or otherwise properly prepared cow's milk with the appropriate addition of carbohydrate to cover the caloric needs.

The problem of the prevention of the so-called deficiency diseases, rickets, tetany and scurvy, no longer is of such major importance as it was some fifteen years ago. The knowledge of the necessity for the routine administration of some form of vitamin D, beginning at two weeks of age, and of vitamin C at the age of three weeks, through the use of orange juice or tomato juice, unless contraindicated, because these juices contain antihæmorrhagic principles not present in ascorbic acid, is now so widespread in Toronto that it is with the greatest difficulty we obtain sufficient cases of rickets and scurvy for demonstration to our students. During the past hospital year, out of 9,098 admissions and 73,437 attendances at the Out-Patient Department, we encountered 10 cases of rickets and 9 cases of scurvy. Also, during 1940 we had 28 cases of tetany in infants over one month of age.

What problems are then left to us as practising physicians in prescribing the diets for children other than seeing that the diets contain an adequate amount of protein, the proper ratio of fat to carbohydrate and sufficient calories,

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* From the Wards and Laboratories of the Hospital for Sick Children and the Department of Pædiatrics, University of Toronto.

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with the addition of vitamins C and D? I may say that there are still many problems to be solved, and today I will tell you of some of the investigations conducted in this department on the nutritional requirements of children.

There are at least 33 food elements essential for normal nutrition. Of the 22 aminoacids furnished by protein ingestion, 12 can be synthesized by the body, leaving 10 which at the present state of our knowledge must be supplied. Carbohydrate, as a source of energy, is necessary, and in the past few years it has been shown that at least one fatty acid is essential for normal nutrition. This makes a total of 12 food substances. In addition, there are at least 13 minerals and 8 vitamins, making a total of 33 food elements which are necessary for normal nutrition.

Our problem then is to find the child's requirements for each of these 33 food substances and the amounts furnished by the commonly used foods. This is not an easy task; in fact it is hard to imagine one more difficult. The daily amount of many of these food elements required by the body is so small that it is very hard even to comprehend. For example, one pound of iron would last the average child for 80 years; 1 pound of iodine would last eighty thousand years, and 1 pound of vitamin D would cover the requirements for an even longer period.

Carbohydrates.—We have never found any evidence of a child receiving a diet containing too small a percentage of carbohydrate. The ease with which we obtain purified carbohydrates in the form of sugars and highly milled flours accounts for this. In fact, the greatest error which we find today is an excess of purified carbohydrate. In some diets, 50% of our calories are in the form of purified flours and sugars, which, as a result of their purification, are lacking in most of the minerals and vitamins.

Fats.—If in addition to an otherwise normal diet, the child receives 30 ounces of milk daily containing from 3.5 to 4% fat, along with 1 ounce of butter, his fat requirements for normal nutrition will be fulfilled.

Protein.—We have obtained no evidence that the average Canadian child receiving a diet at all reasonable suffers from a lack of protein. It is usually considered that 15% of the calories supplied should be in the form of protein, and 50% of this protein requirement should be grade A protein, that is, protein obtained from such foods as milk, meat, fish, eggs and cheese. The grade A protein requirements will almost be fulfilled if the child receives 30 ounces of milk daily.

Minerals.—The 13 minerals necessary are calcium, magnesium, sodium, potassium, phosphorus, chlorine, sulphur, manganese, iodine, iron, zinc, cobalt and copper. Of these 13 minerals the supply of at least three should not be left to chance. Large amounts of calcium are necessary on account of the rapid skeletal growth during childhood. Our chief sources of calcium are milk and cheese. The importance of milk as a source of calcium can be readily understood when I tell you that from 70 to 80% of the total calcium intake of the average child is furnished by milk. Thirty ounces of milk daily along with some leafy vegetables will cover the calcium needs of the average child.

Our knowledge of the *iron requirements* of the child is still in a state of transition. It is evident that the amount of iron that he requires varies with his age. The recommended daily allowances are given in the tables published by the Committee on Foods and Nutrition, National Research Council, Washington.[2] For example it is recommended that a child 1 to 3 years of age receive 7 mgm. daily, whereas for children 13 to 20 years of age, 15 mgm. is advised. The only other members of the population that need as much as the latter are pregnant and lactating women. However, work done in Wisconsin[3] and by Summerfeldt[4] in our department shows that we cannot simply consider iron in terms of the total amount in the food. We have found that there is a marked variation in the availability of iron in different foods. For these reasons in the future it will be necessary to consider iron not only from the standpoint of the total iron content of the foods given, but from the standpoint of the availability of the iron administered. Vegetables, especially the legumes and green vegetables, fruits, whole grain products, liver, kidney, meat and eggs, and molasses are our richest sources of iron in food. In order to provide 15 mgm. daily these foods must be used liberally.

The third mineral element which requires special attention in regard to its administration in our part of the country is iodine. The chief source of iodine is sea-food, but due to our distance from the sea we have to take special measures for its incorporation in the diet. This is done through the exclusive use of iodized salt.

Besides the two well recognized mineral deficiency diseases, namely, nutritional anæmia, caused by a lack of iron, and simple goitre, caused by a lack of iodine, the work of Elizabeth Chant Robertson[5] of our department shows that a deficiency in the diet of minerals definitely reduces the tone of the intestinal tract. Animals were fed a diet low in minerals but otherwise adequate, and another group of litter mates were fed a similar but completely adequate diet. It was found that the animals in the former group had a much dilated or relaxed intestinal tract with a definite delay in the rate with which fæcal material was excreted. Calcium was the most important factor in preventing this condition. This work is another illustration of the necessity of an adequate supply of minerals in the diet. The effect of a low-mineral intake on the resistance of the individual against infection will be discussed later.

Vitamin A.—A lack of vitamin A results in the development of xerophthalmia. Post-mortem examination of these animals also shows profound pathological changes throughout the whole body. They nearly all suffer from infections in the sinuses, and bronchopneumonia. In these animals changes occur not only in the epithelium of the respiratory tract, but also of the genito-urinary tract. It is important to remember that the lack of any of the vitamins not only causes the well-recognized deficiency diseases but also produces other changes which we usually do not recognize and which very seriously affect the health of the individual. I cannot emphasize this point too strongly.

If the vitamin A deficiency has not progressed too far the administration of this food element will result in the recovery of the animal.

We very seldom encounter evidence in Toronto of a deficiency of vitamin A. The records of the Hospital for Sick Children show that over the period of the last 15 years we have only had 3 cases of xerophthalmia. This is what would be expected when one considers the wide and abundant distribution of this vitamin. It is present in large amounts in the fat of dairy products, liver, kidney and egg, and its precursor, carotene, is present in outstandingly large amounts in coloured vegetables and fruits. Snelling,[6] of our department, has carried out an investigation to determine whether there was any evidence in the general child population of Toronto of a relative lack of vitamin A, but found no evidence of it.

Vitamin B complex.—The vitamin B complex is divided into a number of different fractions, but from the clinical standpoint at present we are only concerned with four, thiamin or vitamin B_1, nicotinic acid, riboflavin and biotin.

The outstanding deficiency disease caused by a lack of vitamin B_1 is beriberi. This disease, which is characterized by polyneuritis, is encountered chiefly in the Far East, but sporadic mild cases have been reported throughout the United States in infants. We have had no evidence of this deficiency disease in Toronto.

Vitamin B_1 is widely but not abundantly distributed. Small amounts are found in various vegetables and fruits; larger amounts in whole grain cereals, liver, kidney, egg, pork and peanut butter. However, the amounts present are all comparatively small. The two most potent sources of this vitamin are yeast and wheat germ. Yeast cannot be regarded as a common article of food, and, in the usual milling methods, the wheat germ which is present in whole grain is discarded and used for the feeding of animals, while we utilize the purified white flour which has practically no vitamin content. It is an advantage to add wheat germ to muffins, porridge, soup and so on. In addition, vitamin B_1 is water-soluble. Therefore, we might expect some loss of this vitamin during the cooking process. A marked loss of this vitamin can occur in this way, not due to any action of heat, but to the vitamin being discarded in the cooking water. Taking into consideration, first, the fact that vitamin B_1 is widely but not abundantly distributed, second, that wheat germ, one of our important sources of this vitamin, is discarded in the preparation of white flour, third, that a portion of this water-soluble vitamin is lost during the cooking process, and, fourth, the fact that often approximately 45% of our diet contains no vitamin B_1, we can see how it is quite possible that our children today, although fed what we consider an adequate diet, may still not be receiving the optimal amount of this food substance.

With the above facts in mind, we substituted for the ordinary purified cereals so widely used in infant feeding a cereal mixture which in addition to supplying calories furnished large amounts of the vitamin B complex and minerals. This was accomplished by including in the mixture wheat germ, brewer's yeast, bone meal and

alfalfa meal. Clinical observations on the effect of feeding this cereal to normal children are quite interesting.

Summerfeldt and Ross[7] of our department took comparable groups of children living in an institution and fed one group the regular diet of the institution and the other group the same diet but substituted for the cereal ordinarily used an equal amount of this special cereal mixture. Accurate records were kept of the weight increase of the two groups of children. To our surprise, the group getting the additional minerals and vitamins gained much more rapidly. In order to confirm these findings, another series of children were taken and divided into three groups. The standard diet of the institution was a good one. The first group of 25 children was fed this standard diet; the second group was fed the same diet but received a vitamin B concentrate in the form of about one-half teaspoonful of powder daily; and a third group, in which the regular cereal of the institution was replaced by the high mineral and vitamin cereal. Over a period of some months it was found that the group getting the additional vitamin B concentrate gained at a somewhat more rapid rate than the control group, while the group getting the vitamin and mineral-rich cereal grew even more rapidly. This is evidence that special care should be taken to insure an adequate supply of not only the vitamin B complex but, in addition, minerals.

Approximately 10% of Canadians use whole wheat bread. This type of bread contains much more of the B vitamins and iron than white bread. Recent dietary surveys[8] have shown that a large proportion of our population eat diets that contain less than the optimum amount of thiamin. Co-operative experiments[9] undertaken by our Department, the Dominion Department of Agriculture, the Dominion Department of Pensions and National Health and some of the milling companies have resulted in the production of a new type of white flour which gives a loaf that contains nearly as much vitamin B_1 and iron as whole wheat bread. In this much superior type of white flour more of the aleuron or sub-bran layers and germ are retained. It does not contain the outer fibrous, branny layers which are irritating to the intestinal tracts of some persons. It is now generally available, and is officially known as "Canada Approved Vitamin B white flour or bread". Its use will definitely increase the amount of the B vitamins consumed, especially by the poor citizens who are heavy bread eaters. Thiamin, or vitamin B_1, has been shown to play an important rôle in human beings. In the young, growth is retarded unless sufficient is eaten. Also individuals who subsist on diets low in this factor are prone to suffer from anorexia and intestinal hypotonia. In addition they cannot metabolize carbohydrates completely; they lack energy and suffer unduly from fatigue.

Recently several American investigators (Sydenstricker and Kruse[10]) have reported that a deficiency of riboflavin leads to the invasion of the cornea by the superficial capillaries of the limbus. These changes result in such symptoms as photophobia, lachrymation and headache. Of course these symptoms may be caused by a variety of conditions, but if they are due to this deficiency they are rapidly relieved by the exhibition of riboflavin in therapeutic doses. It is generally conceded that unless a pint of milk or an equivalent amount of cheese is eaten every day the riboflavin needs will not be met.

A deficiency of nicotinic acid causes pellagra. However, we do not encounter this disease in Toronto.

Vitamin C.—Vitamin C is very readily destroyed by oxidation especially in the presence of heat. Therefore ordinary methods of cooking destroy some of this food substance. It is also very soluble in water and much of it escapes into the water in which vegetables are cooked. In order to retain the maximum amount of it, the food should be cooked for the minimum length of time in the least amount of actively boiling water. Also, the food should not be kept warm for prolonged periods. The cooking water should always be used. The addition of sodium bicarbonate to vegetables during cooking markedly increases the destruction of vitamin C. In order to obtain sufficient vitamin C, it is essential that orange, grapefruit or tomato juice, and, in the child over two years of age, some raw vegetables, especially tender cabbage, be included each day in the diet. In children over five, it is recommended that 4 oz. of orange or grapefruit juice, or 8 oz. of tomato juice be given each day.

The vegetables and fruits vary greatly as sources of vitamin C. Drake and others[11] in our department are carrying on an extended investigation on this and allied problems. The following foods are excellent sources of vitamin C: Raw or tinned citrus fruit juices, raw or

tinned tomatoes or tomato juice, members of the cabbage family, strawberries, raspberries, currants and cantaloupe. Turnips, potatoes, and the green vegetables also contain valuable amounts of it. Head lettuce is unfortunately not nearly as rich in it as the others.

Vitamin D.—Probably more work has been reported on vitamin D than on any other food substance. In spite of all this work and the great progress that has been made, there are still some debatable points. Our chief sources of vitamin D are fish oils, sunshine, irradiated foods, and irradiated ergosterol. There is no appreciable amount of vitamin D in ordinary foods. From this it is evident that it was meant that the human race should obtain its vitamin D from sunshine. In our northern climate our investigations have shown that winter sunshine for four months of the year in Toronto is only one-eighth as potent as summer sunshine, and, from a practical standpoint, due to our inclement weather, there is evidence that our children receive very little vitamin D effect from sunshine for nearly eight months of the year. The ultraviolet rays of sunshine producing this vitamin D effect do not penetrate the clothing, and they are also cut off by ordinary glass. The smoke and dust in most of our large cities cut off over 50% of these rays. So it would seem that our modern civilization is doing its best to reduce the vitamin D effect of sunshine.

We would be remiss if we did not mention the results of an investigation we have conducted on the value of irradiated milk as a source of vitamin D.[12] We have found that the routine administration of the milk requirements of infants in the form of either irradiated pasteurized milk or irradiated evaporated milk has resulted in the prevention of moderate or marked rickets. It is true that we have had some cases of mild rickets develop and we feel that additional vitamin D should certainly be given during the early months of life, when the child's milk requirements are low and the need for vitamin D is great. But in spite of this, it would appear that in irradiated vitamin D milk we have a valuable addition to our present antirachitic armamentarium.

What evidence have we of the need of vitamin D past the age of infancy? In view of the fact that vitamin D is necessary for the optimal utilization of calcium and phosphorus, and realizing that the teeth are composed largely of calcium phosphate, we conducted an investigation on the effect of vitamin D in the prevention of tooth decay.[13] Two groups of children ranging in age from 5 to 15 years were observed over a period of one year. The diets in both cases were exactly the same, with the exception that the one group received additional vitamin D daily. X-rays were taken and instrumental examinations of the teeth were made with meticulous care by the dentists. Incidentally, examination of the children was made without any knowledge as to which group the children belonged. When the examinations were completed the results were tabulated, and it was found that the number of markedly progressive cavities and the number of new cavities were twice as frequent in the children who did not receive an adequate supply of vitamin D as in those who did. This is evidence of the need of vitamin D past the age of infancy. If it is not possible to expose children to sunshine throughout the year, we strongly recommend that some vitamin D be administered not only during the age of infancy but throughout the whole of childhood.

Resistance to Infection

We have previously mentioned that a lack of any one of these 33 food substances necessary for normal nutrition interferes with the health of the body. Work conducted by Elizabeth Chant Robertson,[14] of our department, on animals, bears this out. A series of investigations were conducted with each of the food elements studied. Animals were put on an adequate diet. Litter mates were then put on the same diet but the one food substance to be studied was reduced in amount, or entirely lacking. Accordingly, any change in the animal could only be the result of the deficiency of this one food substance. The animals were then fed a measured amount of a disease producing organism (rat typhoid) and the number of survivors noted. Dead animals were carefully autopsied and the organs cultured to be certain that they did not die from extraneous causes. This work showed that a lack of vitamin A, a lack of the vitamin B complex, rickets, a lack of the minerals, and a lack of grade A protein definitely lowers resistance to infection. The significance of this work and its possible application to human nutrition is obvious.

How then are we going to put all this information into practical use? It can be done very simply. Build up the diet of our children

around 7 types of food: (1) Milk, 30 ounces daily, which is of great value in supplying grade A protein, many of the minerals, particularly calcium, vitamin A and riboflavin. (2) Citrus or tomato juice to furnish vitamin C. (3) Meat, as a source of grade A protein, iron and the B vitamins. (4) Eggs, as a source of grade A protein, minerals and most of the vitamins. (5) Vegetables to supply minerals and most of the vitamins; the green and orange vegetables have high vitamin A value. (6) Whole grain cereals and bread. If indicated Canada Approved Vitamin B white bread can be substituted for the latter, but nutritionally it is not quite so good. (7) Iodized salt for all cooking and seasoning. In addition, if one is not in a part of the country where the child can be exposed to sunshine, vitamin D in one of its many forms should be administered.

In concluding I cannot do better than quote from Dr. James S. McLester's presidential address delivered at the joint meeting of the American and Canadian Medical Associations at Atlantic City in June, 1935:

"In the future, science promises to those races who will take advantage of the newer knowledge of nutrition, a larger stature, greater vigour, increased longevity and a higher level of cultural attainment. To a measurable degree man is now master of his own destiny where once he was subject only to the grim hand of fate."[15]

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RÉSUMÉ

La nutrition physiologique de l'enfant commence avant sa naissance par l'alimentation adéquate de sa mère. En dehors de la connaissance des éléments nutritifs indispensables à la vie, la diététicienne moderne doit savoir qu'il existe 33 autres éléments essentiels d'une bonne nutrition: 22 acides aminés et 12 variétés d'hydrates de carbone. Les hydrates de carbone sont habituellement en excès dans l'alimentation usuelle mais les graisses sont assez bien proportionnées. Les protéines seront suffisantes si l'enfant boit 30 onces de lait par jour. Parmi les minéraux il faut surveiller l'apport du calcium, du fer et de l'iode.

La vitamine A sera puisée dans les végétaux colorés et dans les fruits, aussi dans les œufs et les viscères tels que les reins et le foie. Le complexe B sera trouvé abondamment dans la levure et le germe de blé; il faudra veiller à la déficience de cette vitamine hydrosoluble. La vitamine C, influencée par la chaleur et soluble dans l'eau sera prise de préférence dans les jus crus de tomates et d'oranges. La vitamine D nous vient des huiles de poissons, du soleil et de l'ergostérine irradiée. On doit l'ajouter aux aliments si le soleil est absent ou rare. On conçoit les maladies causées par les déficiences alimentaires. On augmentera la resistance à la maladie en dressant pour nos enfants des menus bien équilibrés. JEAN SAUCIER

THERMAL BURNS

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THIS paper is a report on the treatment of burns, with a discussion of the physiological disturbances which follow severe burning as we understand them at the present time. It is based on the experience derived from the investigation and treatment of 50 cases of severe burns in soldiers, and on some observation of patients in burn centres of the Emergency Medical Service of the Ministry of Health of Great Britain, with which we have been associated or which we have been privileged to visit. The whole question of the treatment of burns is at present in a controversial state. The methods of treatment described here and the opinions expressed are the result of personal experience.

Causes and extent of burns.—The great majority of these burns were accidental in origin. Of the 50, only 6 were the result of enemy action. By far the commonest cause was the accidental ignition of petrol. A very frequent cause was the explosion of petrol cookers, and a few resulted from attempts to light or hasten fires by the addition of petrol. Steam or hot water accounted for six; cordite flash for one; accidental explosion of incendaries for two.

As would be expected, the exposed parts of the body were most frequently burned. The hands were involved in 32 cases, the face in 24. The arms were burned in 20, legs in 11, chest in 7, thighs in 6, abdomen in 3, feet in 3, and buttocks in 2. Hands and face alone were burned in 8 cases.

Most of the burns involved less than 10% of the body surface. Fig. 1 shows the relationship between the number of cases and the extent of burns.

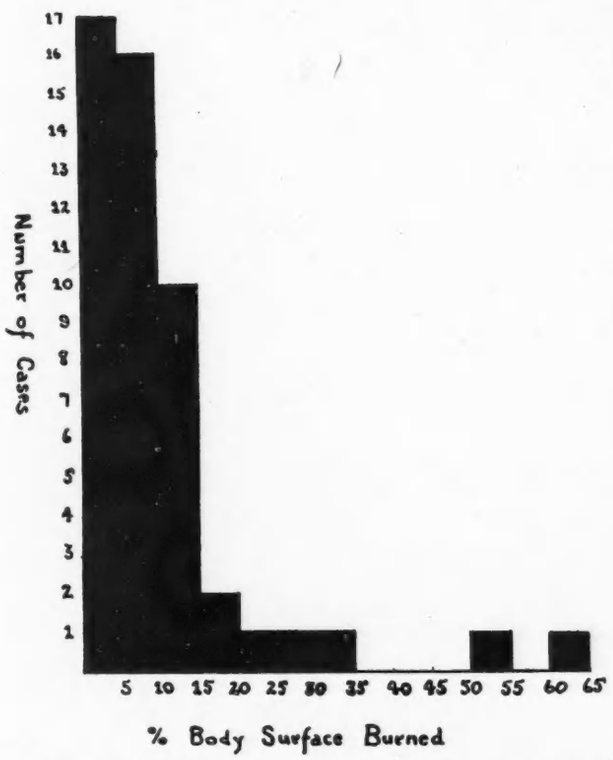

Fig. 1.—Relationship between number of cases and extent of burn expressed as a percentage of the total surface area of the body.

Physiological disturbances and systemic treatment.—In considering the treatment of burns there has been a tendency to focus attention on the burned area, and to neglect the consideration of the patient as a whole. The patient suffers pain and inconvenience, and later perhaps deformity, at the site of his burn, and it is natural that it should attract a great deal of attention. But he is likely to suffer death as the end-result of a series of physiological disturbances initiated by burning, which cannot be controlled by the local treatment of the burned area. The physiological disturbances must command immediate attention, and local treatment of the burn must be controlled by consideration of these factors.

Burn shock.—(*a*) *Primary shock.*—Immediately after sustaining a burn the individual may be found to be in a state of collapse or "primary shock". This is neurogenic in nature, and is produced by a combination of fright and pain. It is characterized by rapid pulse, low blood pressure, rapid and shallow respirations. It passes off in a few minutes to an hour if the patient is kept in the recumbent position, given morphia or some other opiate, and kept warm and quiet. During this period he should not be moved more than necessary. Intravenous fluids should not be given at this period. It is our experience with patients who have been given intravenous plasma at this stage, that the later development of hæmoconcentration and burn shock has not been prevented, and in two cases we have seen a moderate pulmonary œdema.

In extensive severe burns the mechanism that determines the development of clinical or "sub-clinical" burn shock may become active before the patient has recovered from the primary shock described above, so that it is impossible to make any distinction between them. Usually, however, the patient will show a clinical improvement, and at this point it is important that he begin to take large quantities of fluids by mouth.

(*b*) *Mechanism of reduction of blood volume.*—The primary factor in the production of shock in the burned patient is the local response of the injured tissues and of the area immediately surrounding the site of injury. As an immediate response to injury there is a dilatation of the capillary bed of the area, with an increase in permeability of the capillary walls, and a transudation into the tissue spaces of fluid which resembles whole blood plasma in its constitution. Where this transudation occurs into the skin it results in the formation of blisters, and, when into the subcutaneous tissues, in the development of œdema.

(*c*) *Measurement of reduced blood volume as hæmoconcentration.*—This transudation of blood plasma into the tissues results in a reduction in the circulating blood volume, and, since the formed elements of the blood are retained in the circulation, this is reflected as a hæmoconcentration, which may be measured. This is most accurately measured by a hæmatocrit reading, but usually by a determination of the concentration of the hæmoglobin. We employ

both methods, the one being a check on the other.

In measuring hæmoconcentration by the determination of hæmoglobin, it is essential that the results be referred to some standard that nearly approaches the normal average for the group of individuals to which the patient belongs. We have found, using the Sahli acid-hæmatin method, that the majority of our healthy soldier patients give a reading in the neighbourhood of 100% referred to a standard of 14.5 grm. of hæmoglobin per 100 c.c. of blood. One is subject to the objection that many normal individuals have a hæmoglobin value considerably above the normal average for their group. We tend, therefore, to disregard a first reading of 110% with this standard, and follow it in two or three hours with a second determination to discover whether concentration is occurring. It is felt, however, that an initial reading of 115 or 120% is reasonably certain to indicate a true hæmoconcentration, and the patient is treated accordingly.

(*d*) *Clinical and sub-clinical shock.*—As the circulating blood volume decreases the cardiovascular system is at first able to compensate for the loss and to maintain the circulation and the blood pressure by increase of heart rate and the constriction of the peripheral blood vessels. This phase we call "sub-clinical" shock, because the clinical syndrome of shock has not developed, although there is evidence that the mechanism which may lead to its development is already operative. This stage can only be identified by the demonstration of hæmoconcentration. It is invariably associated with elevation of temperature.

If the loss of plasma from the blood stream continues unchecked, the compensation reserve of the cardiovascular system eventually becomes exhausted, and the blood pressure falls. The patient then presents the clinical picture of shock, with rapid pulse and respiration, pallor and cyanosis. We have not seen a patient with a serious fall in blood pressure, and this stage of clinical shock in burns should seldom occur if these patients are adequately treated at an early stage.

(*e*) *Plasma proteins and plasma chlorides.*—Since the fluid lost from the blood stream into the burned area is almost identical in composition with the blood plasma, we should expect little alteration in the concentration of the proteins of the circulating blood. Such is the case in the first few hours after the burn and throughout the whole clinical course in most cases. In those patients, however, who have a continual large loss of plasma from the surface of extensive burned areas we have found that the plasma protein concentration falls very rapidly, and especially so if large quantities of fluid are being taken. We have given these patients sufficient quantities of twice concentrated human serum, to bring the serum proteins up to a minimum of 6 grm. per 100 c.c. of blood. When this is done it is followed by a rapid reduction of the œdema in the burned area, a return of the temperature towards normal, and a definite improvement in the clinical appearance of the patient. We have not found it necessary to give the quantity of serum which calculation would suggest to be necessary to replace the protein deficit, and we feel that protein is returned to the circulation from the interstitial spaces as the œdema in the burned area is reduced.

There is a consistent small reduction in the plasma chlorides in our cases, which does not seem to bear any constant relationship to the degree of hæmoconcentration. This reduction has never been great enough to cause us any concern.

(*f*) *Relation of hæmoconcentration to burn.*—The degree of reduction of blood volume, as demonstrated by hæmoconcentration, appears to bear no relationship to the depth of burn. It is roughly proportional to the œdema in the burned area, and to the surface area from which the superficial loss of plasma is occurring.

GENERAL TREATMENT

It is our practice not to commence the systemic treatment of the burned patient until we have obtained an estimation of the hæmoglobin and a hæmatocrit reading. Blood is taken for these immediately on admission to hospital, and the results are available within thirty minutes. In the interval the patient is put to bed, warmed, and given a sedative if that is considered necessary.

It has been our experience that plasma loss in burns cannot be readily controlled by the administration of saline, or by giving serum or plasma in dilution or normal concentration. In all cases where we have attempted to control the loss by these methods the patients have had a recurring hæmoconcentration, and have re-

quired repeated administrations of large quantities over a comparatively short time. In these patients, too, the œdema of the burned area has not been relieved, but has rather extended. It is now our practice to administer concentrated human serum to all patients who have a hæmoconcentration, and to give fluids by mouth only to those who do not show this phenomenon.

We have used concentrated serum made up from the dried preparation to half the normal volume; this is, twice concentrated. Our practice is to give this in unit doses of 200 c.c., and to check the results after six hours by a hæmatological examination. If examination of the blood after administration of the first "dose" of concentrated serum shows that some hæmoconcentration still exists, a further 200 c.c. is given. On no occasion yet have we required a third dose. If the patient is able to take fluids by mouth, nothing further is given by the intravenous route in the interval. If he is unable to take fluids by mouth the administration of the serum is followed by one litre of 5% glucose in saline, given by a slow drip. In no case have we failed to obtain a significant reduction of the hæmoconcentration by this procedure, and we find that it is always maintained, in contrast with our results with normal reconstituted serum, or normal plasma diluted with anti-coagulant solution. In all cases the administration of concentrated serum has resulted in a rapid decrease of the œdema in the burned area. This may most readily be demonstrated in the case of burns of the face and dorsum of the hands. We feel that this early reduction of œdema has a definite influence on the healing and on the prognosis for function of the affected part.

When the hæmoconcentration is relieved the pulse rate and temperature are rapidly reduced, and the patient is generally much more comfortable. Of the patients in our series who have received concentrated serum, 17% have had a mild febrile reaction with a rigor during administration. This is the only type of reaction we have encountered, and in no case has it been in any way serious.

All patients with serious burns should have a fluid balance chart kept from the time of their admission. So long as the fluid balance is reasonably maintained the intake should not be less than 3,000 c.c. in 24 hours, and the larger part of this should be made up of fluids containing glucose. When possible, it is our habit to give fruit juice with glucose added.

Burn "toxæmia".—The free use of the term "toxæmia" in explaining certain complications in the burned patient should not be taken to imply the existence of a definite toxin. To our knowledge no direct evidence of such has yet been shown. The unquestioning acceptance of such a toxin as explaining the complications seen seems likely to militate against the determination of the true cause of these phenomena. We have not yet seen the syndrome described as "toxæmia" in any patient in whom the physiological disturbances have been adequately controlled in the early stages. We have seen it in several patients not controlled, and in one patient who had received an excessive amount of plasma during the first four days following a burn of minor extent. There is increasing experimental, clinical and pathological evidence to suggest that the complications which have been described as toxæmia may be the result of damage to the parenchymatous organs, particularly the liver and kidney, which results from mechanical factors acting on the circulation of these organs in the early stages, and related to hæmoconcentration with or without associated reduction in systemic blood pressure. It is hoped to draw attention to some of these factors in a subsequent report.

Complications in the Early Stages

Deaths during the days immediately after burning are due to complications in the lungs, liver and kidneys. The occurrence of these complications, however, is not inevitably fatal.

Pneumonia may be superimposed on pulmonary changes related to the physiological disturbances which follow burning or treatment. We have seen pneumonia in two patients in our series. In one case it developed on a basis of pulmonary œdema which followed the administration of considerable quantities of plasma in the very early stages after burning. In the second case the original pulmonary complication appeared within the first 48 hours, and was diagnosed clinically as a pulmonary infarct. One patient was given sulfapyridine by mouth. The other patient had a concurrent granulocytopenia, and in consideration of this the drug was withheld. Both recovered without any remarkable incident.

The most common complication seen in our series of patients has been a mild jaundice. We

have seen this in five patients. Two of these were admitted to us on the fourth day after burning, and were jaundiced on admission. A third was admitted on the second day and developed jaundice on the third day. Another case in which we have seen it was the first burned patient admitted to this unit. None of these patients had had an adequate control of their hæmoconcentration in the early stages. The occurrence of this complication has been ascribed by some authors to the use of general anæsthesia at the original dressing, and by others to the use of tannic acid. Of these five patients, two did not have an anæsthetic, and only one was tanned. Treatment of these jaundiced patients consisted simply of the administration of fluids containing large quantities of glucose.

Renal failure is the most fatal complication of the early stage of burns. We have had one patient in our series who had a progressive reduction in the urinary output leading to anuria and death on the fourth day. We have seen one other similar case. In our case we attempted to stimulate the secretion of urine by giving large quantities of fluid and the intravenous administration of 50% glucose solution, without success. As a measure of desperation an attempt was made to promote urinary excretion by relaxing the blood vessels in the renal area by a subarachnoid spinal block with percaine. This, too, was unsuccessful. At autopsy it was evident that this patient had suffered from chronic renal disease before burning. We have had no evidence of renal damage in any other patient in this series.

We have seen one patient who had progressing granulocytopenia from the sixth day after burning. This patient was admitted to us on the fourth day and had an extensive (55%) burn which was heavily infected with mixed organisms. He had received 12 grm. of sulfanilamide by mouth before admission to us. He received none after admission, either by mouth or by local application. A transfusion of stored blood failed to effect any improvement in the number of white blood cells. When his white blood cell count had decreased to 3,800 cells per c.mm., with 40% of granular cells in the differential count, we again transfused him with 250 c.c. of fresh blood. Following this his white cell count increased to 6,000 in 18 hours, and to 10,000 by the second day. We are at a loss to explain his agranulocytosis, unless perhaps it be related to the previous administration of sulfanilamide, or to the massive infection from which he suffered at the time.

Infection.—The control of infection is a problem related to the local treatment of the burned areas, and will be dealt with in the third section of this report. The method which we have used most frequently is the local application to the burned surface of sulfanilamide in powder form. This is very rapidly absorbed into the circulation, and may reach concentrations which produce toxic manifestations. The first sign of absorption of considerable quantities of the drug is cyanosis, and the appearance of this should serve as a warning to reduce the amount of drug applied, or to discontinue it entirely. The level of the free sulfanilamide in the blood should be closely followed in these patients. With a toxic level of sulfanilamide in the blood the patient becomes at first confused, then delirious; cyanosis increases, and dyspnœa appears. Unless the concentration is rapidly reduced coma follows. Treatment consists of the administration of 5% glucose in saline by intravenous drip, and of sodium bicarbonate by mouth. The intravenous fluid assists in washing out the sulfanilamide from the blood, and the sodium bicarbonate tends to counteract the acidosis which is produced by high concentrations of the drug in the body. It may be advisable in some patients to administer oxygen in high concentration. The parts which have been dressed with the sulfanilamide powder should be bathed to remove as much as possible of the drug remaining on the surface.

Patients dying after the first week following burning appear to die from the effects of infection. At autopsy most of these patients show multiple small abscesses in the liver, spleen, kidneys and lungs. The treatment of these patients consists of control of the local infection, and general treatment with the sulfonamide group of drugs, of which sulfathiazole and sulfadiazine appear from current reports to be the most efficient.

After the first few days there is frequently a rapid decrease in the red cells of the blood, as demonstrated by a decrease in red cell count and hæmoglobin concentration. This appears to be related chiefly to infection of the burned areas, and may be the result of absorption of

bacterial toxins from the area. This phenomenon is more frequent and severe in patients who are being treated at this stage in the saline bath or with saline pack dressings. Frequent estimations of hæmoglobin should be made, and blood transfusion is indicated when the hæmoglobin falls below 60% of the normal value.

During the past year we have not found it necessary to give a general anæsthetic to any patient in the early days after burning. The most extensive burns may be adequately cleaned, if done gently, with the administration of a moderate dose of morphia. We feel that these patients should not be subjected to anæsthesia, which may contribute to the development of clinical shock, and add to the severity of the physiological disturbances already present.

When an anæsthetic is indicated for skin grafting or similar treatment in the stage of healing, it should be given only after determination of hæmoglobin, and after transfusion, if such is indicated. We have found both pentothal and cyclopropane to be satisfactory agents for anæsthesia at this stage. Ether is not contraindicated, but we have observed that these patients require more than usual amounts of this agent, and that the incidence of vomiting after ether anæsthesia is greater than that seen in patients who have not been burned.

LOCAL TREATMENT

First aid.—Tannic acid in some form was used as a first-aid dressing in most cases. Occasional dressings were picric acid, gentian violet jelly, vaseline, engine oil, and saline.

Early in the war tannic acid preparations were advocated as a first-aid treatment. It soon became obvious that there were disadvantages in its use which outweighed its advantages. The chief disadvantage was the development of infection because the early use of tannic acid had prevented thorough cleansing. Since the fall of 1940 one of us (S.D.G.) has advocated that such preparations be abandoned entirely, and that the first-aid dressing consist merely of dry clean gauze or saline compresses. Both of these have a definite drawback in that the dressing sticks to the burn and adds to the discomfort and, probably, to the damage when the burn is treated at hospital.

It would seem that the best first-aid dressing is one which will not stick, and which will have bacteriostatic or antiseptic action. Many investigations are being carried out at the present time with mixtures of sulfonamide in oil or wax bases. It may be that such a preparation will prove to be the first-aid dressing of the future.

The cases treated may readily be divided into three groups according to the method of local treatment. All cases were cleaned with gauze and soap and water, and were debrided as soon after their admission as their condition permitted. Swabs for bacteriological culture were taken at this time, and at regular intervals until healing occurred.

Sulfonamide, tulle gras and saline.—Thirty-four cases were treated with sulfonamide, tulle gras and saline dressings. After the preliminary cleansing and debridement the burned area was dusted with sulfonamide powder, covered with one layer of tulle gras, and overlaid with warm saline compresses. Thereafter the dressing was done three times daily, at only one of which the tulle gras was changed.

All the burns of the hand in this group were given a daily hand bath of warm saline. If streptococci shown on culture did not clear in a few days, the saline in the hand bath was replaced by soap solution.

Early movement was encouraged in this group. This applied particularly to hands, and each patient with burns of the hand was made to move the fingers and wrists from the first day. This was done on the assumption that the œdema about the joints was not an inflammatory one. Early movement aimed at getting full function back at the earliest possible moment. This may also be a factor in the elimination of œdema. As previously mentioned, all patients receiving this form of therapy must be watched carefully for signs and symptoms of sulfonamide poisoning.

The average stay in hospital for this group was approximately 35 days. Seven of this group required grafting. Five of these were hands. Of these, only two had not a full range of motion on discharge. Both were improving rapidly, and it is believed that they should eventually attain normal function.

Tannic acid.—Twelve cases were tanned, and with one exception they all did well. The exception was the only death in this series, and his burns, estimated to involve 62% of his body surface, were both extensive and deep enough to make his recovery under any method of treatment very doubtful.

Twenty per cent aqueous solution of tannic acid was used in most cases. The edges of the tan were painted daily with 1% gentian violet or 20% mercurochrome. The average time for complete separation of the tan was three weeks. In no case did serious infection develop. Two cases healed without becoming infected. The tan was removed as soon as possible, once infection did become evident, by the use of eusol dressings. The average stay in hospital of this group was 58 days. Four cases were grafted, and in these the average time for separation of the tan was 25 days. Eight of these cases were burns of the hands. The average time in hospital for these eight was 45 days. With one exception they left hospital with a full range of movement, and this patient has recovered complete use of his hand. Narrowing of the second phalanx, with thinning of the distal phalanx, was seen occasionally; the so-called spindle finger. This condition is seen in cases which have not been treated with tannic acid. It is suggested that tissue loss may occur due to interference with the blood supply as a result of two factors, (1) increased viscosity of the blood, and (2) increased local pressure in the tissues due to œdema.

At the present time we are not treating burns of the face or hands by tanning.

Saline bath therapy.—Treatment in a bath of normal saline at constant temperature, to which one gallon of warm saline per minute is added, was used in four cases. Three of these were received late, two on the fourth and one on the eighth day. They were badly infected, discharged profusely, and ordinary dressings were very painful. One of these patients had a burn involving 55% of his body surface.

The usual routine has been one hour daily in the bath. If the burn is extensive, this may be followed by a severe reaction characterized by chills and a high fever. Where this has occurred a daily bath has not been given, but one every second or third day, depending on the patient's clinical condition. In the intervals the dressings are moistened with saline, but are not removed.

In this group the saline bath proved to be of definite value. It is difficult to imagine how else extensive and infected burns could be kept clean, both to the visual and olfactory senses, with as little discomfort to all concerned. We believe that the saline bath has a definite and important part in the treatment of extensive burns.

SUMMARY

1. The causes and extent of 50 burns seen in soldiers are described.

2. Physiological disturbances in burned patients are discussed and related to the general treatment in this series of patients.

3. Methods of treatment of the burned areas are described, including first-aid measures. The results obtained with each method of local treatment used in this series of patients are given.

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RÉSUMÉ

Cette étude est basée sur l'analyse de 50 cas traités selon nos conceptions personnelles. La plupart de nos brûlés ont été les victimes d'accidents dûs au pétrole et chez le plus grand nombre pas plus de 10% de la surface cutanée n'a été atteinte. Après une brûlure grave le malade est souvent en état de shock; on ne doit pas alors le manipuler mais le laisser au repos. Lorsque la phase de shock disparaît il faut le faire boire abondamment car la zône brûlée fait un appel considérable de plasma. La concentration sanguine augmente et la température s'élève au dessus de la normale. Si le traitement n'est pas institué tôt, la T.A. baisse, le malade se cyanose, le pouls et la respiration s'accélèrent. Les protéines du sang diminuent et il faut les remplacer artificiellement; les chlorures sont plus stables. La réduction du volume sanguin est proportionnelle à l'œdème de la région brûlée. Lorsque le malade est calmé nous lui donnons du sérum humain concentré si sa concentration sanguine est augmentée; dans le cas contraire nous le faisons simplement boire beaucoup. La mort consécutive aux brûlures est rare; elle est le fait de complications pulmonaires rénales ou hépatiques. Plus fréquemment nous avons noté un ictère léger. Un malade est mort en anurie mais ses reins étaient déjà malades avant la brûlure. L'infection est prévenue par l'application locale de sulfanilamide pulvérisée. Ces applications

doivent être suveillées par des dosages fréquents. L'infection confirmée sera traitée par le sulfathiazole et la sulfadiazine. Localement nous avons utilisé au début l'acide tannique, l'acide picrique, le violet de gentiane, la vaseline, l'huile minérale et le sérum physiologique. Le bain au sérum a donné les meilleurs résultats curatifs et prophylactiques de l'infection.

JEAN SAUCIER

BROMIDE INTOXICATION*

By H. K. Detweiler, M.D., F.R.C.P.(C)†

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THE recognition of bromide intoxication has not received the attention of physicians which the prevalence of this condition warrants. The various bromide preparations have been regarded as relatively innocuous for so long a time that the profession as a whole has become casual in its use of these drugs, and many physicians fail to keep on the alert for possible toxic effects. Of course the appearance of a rash is readily recognized by everyone, and attention is paid to its implications. This is not the case, however, in many instances where more profound manifestations of toxic effect are present, and the difficulty is further enhanced by the fact that cutaneous lesions are surprisingly uncommon in this type of case. This paper is concerned only with those cases exhibiting a toxic psychosis.

In hospital experience as well as in consulting practice, I have been impressed with the more or less regular occurrence of this condition. I do not mean to suggest that the number is large, but it is sufficiently large to merit attention. In the medical wards of the Toronto Western Hospital, a service averaging just under 100 beds, we have recorded 16 cases during the past 4 years. At the Toronto Psychiatric Hospital[1] there were 45 cases of bromide poisoning in 1,785 admissions. At the Henry Phipps Psychiatric Clinic in Philadelphia,[2] there were 20 cases of bromism in 238 admissions. In the Colorado Psychopathic Hospital, Wagner and Bunbury[3] report that in 1,000 admissions 44 suffered from bromide psychosis.

Bromide therapy, introduced in 1857, has deservedly enjoyed a wide popularity on account of the sedative action of the drug in the treatment of nervous disorders. Since the drug may be obtained without a prescription, self-medication with proprietary bromide preparations, which are extensively advertised to the public, is common. As Barbour[4] points out, the bromide content is not always suggested by the name, *e.g.*, "Yeast-vite". However, a large proportion of the cases of chronic bromide poisoning has been due to medication by doctor's prescription. In England it was found that one out of every eight consecutive prescriptions for internal use contained bromide, and that in over 8 million prescriptions a year bromide is the principal ingredient.[4] While I doubt that the same conditions hold for Canada, there is every reason to believe that surprisingly large quantities of the drug are prescribed here. Now this in itself is not necessarily reprehensible if proper supervision of the patient and his use of the prescription is exercised by the physician. The danger lies in the fact that since a fresh order is not required each time the druggist fills the prescription, patients may go on and on, taking the drug without the doctor's knowledge, or, if he does know, without the fact being brought to his attention from time to time by reason of the necessity for his signature.

CLINICAL FEATURES

There are no pathognomonic symptoms or signs of this condition. The history and physical findings lead one to a tentative diagnosis only; a raised bromide blood level renders the diagnosis highly probable, but certainty is only established when the symptoms disappear coincidentally with a disappearance of the excess bromide from the blood. In a mild case, there may be undue fatigue, headache, sleeplessness, difficulty in concentration, numbness, anorexia, and constipation. Since some of these are symptoms for which bromide is frequently prescribed in the first place, it is easily seen how difficult it may be to detect the earlier evidences of intoxication with this drug. As the condition progresses in severity the patient becomes restless and agitated, is unsteady on the feet; speech is slurred, the lips quiver, and the hands are tremulous. Delirium is frequent, with hallucinations and delusions of very disturbing character. If the drug is continued the patient may become comatose, with nystagmoid movements of the eyes and loss of deep reflexes.

The following brief summaries will illustrate a common type of case:

* Read at the Seventy-third Annual Meeting of the Canadian Medical Association, Jasper Park, Alta., June, 1942.

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CASE 1

Mrs. L.B., aged 47, admitted August 23, 1940, because of mental confusion, thick speech, drowsiness, lack of control of legs (falling). A history was obtained from her friends to the effect that she had been taking "bromides, nembutal, etc." in undetermined amounts. Serum bromide on admission was 260 mgm. per 100 c.c. (sod. bromide 338 mgm.). Under treatment she gradually improved. On September 3, 1940, serum bromide was 150 mgm. and on November 11, 1940, 14 mgm. (18.2 sod. bromide) per 100 c.c. She was discharged November 24, 1940, apparently recovered.

CASE 2

Mrs. M.McM., aged 59, admitted March 12, 1939, because of confused mental state, drowsiness and weakness of the legs for 3 weeks. For two weeks, her speech was slurred and she had developed an acneform rash on the face. The history was that she had taken 60 gr. of bromide daily for a week or so. Serum bromide was 240 mgm. (sod. bromide 309 mgm.) per 100 c.c. She was placed on sod. chloride gr. lx per day and 3 days later the serum bromide was 200 mgm. per 100 c.c. At this point she was transferred to the Psychiatric Hospital where she died 10 days later.

Patients suffering from myocardial failure are frequently encountered in a state of bromide intoxication. This is due to the use of this sedative in an attempt to control the restlessness so prevalent in this disease, and the effect is accelerated by the fact that these cases are usually on a salt-free diet, which favours the accumulation of bromide in the body. The following case will illustrate this point:

CASE 3

Mrs. A.H., aged 46, was admitted July 14, 1938, because of arteriosclerotic heart disease with angina pectoris. She was placed on restricted fluids and a salt-free diet. Because of restlessness she was given 45 gr. bromide per day for 2 weeks. A fortnight after this was discontinued she began to exhibit mental confusion, with hallucinations and delusions. A psychiatrist's impression was that she was a manic-depressive. On August 13th, the serum bromide was found to be 220 mgm. per 100 c.c. (sod. bromide 283 mgm.). Subsequent improvement coincident with a reduction in the bromide content of the blood confirmed the diagnosis of bromide intoxication.

Chronic alcoholics are particularly susceptible to the development of bromide poisoning, since they are usually on an unbalanced and inadequate diet and the chloride intake is apt to be low. Then, too, this type of patient is likely to attempt self-medication in the form of bromoseltzer or other bromide mixtures and as Gundry[5] points out they are inclined to take excessive doses. Cross[6] warns against the prescribing of bromides in the treatment of chronic alcoholism. These patients may even contract the bromide intoxication in the course of treatment in an institution for the purpose of curing their alcoholism:

CASE 4

Mr. F.P., aged 35. was admitted September 23, 1939, under the care of an otolaryngologist because of nasal obstruction. It was at once apparent that he was drowsy and confused; his speech was slurred and he staggered when attempting to walk. It was then learned that he had been discharged a day or two previously from an institution for the cure of alcoholism. His serum bromide was 473 mgm. (615 sodium bromide) per 100 c.c. He recovered slowly, although it was a month before the bromide reached the level of 102 mgm. He returned to his home and two months later the serum bromide was 15 mgm. per 100 c.c.

It is important to recognize the fact that skin lesions, so well known to physicians prescribing bromides and iodides, may be conspicuous by their absence in the type of case under present consideration. Cross[6] states that they are "just as often absent as present", and "no reliance can be placed on the absence or presence of a bromide rash". Gundry[5] states that cutaneous lesions were present in only 4 out of 15 cases. In our series bromodermia occurred in exactly 25% of the patients.

In my opinion, it is impossible to set down a definite figure for the serum or plasma bromide level beyond which toxic symptoms will appear. Some authors have arbitrarily set 116 mgm. bromide (150 mgm. sod. bromide) per 100 c.c. as the toxic level. I have seen fairly marked symptoms in a case where the blood bromide level was as low as 65 mgm. per 100 c.c., and it is well known that individuals may have a blood content well above 200 mgm. and exhibit no ill-effect. The factors which govern the readiness or otherwise of any given patient to become toxic may be summed up as follows: (1) A healthy person will tolerate bromide better than one in ill-health, other things being equal. (2) The age of the patient is important. Elderly individuals are more liable to bromism than the young. The age-factor is probably connected with the vascular state, since the presence of arteriosclerosis, particularly cerebral arteriosclerosis, enhances the susceptibility. (3) There is a marked individual variation. Some people inherit an unstable nervous system, and are easily disturbed by toxic states, just as they are by emotional or physical stresses. (4) The presence of renal or cardio-renal disease enhances the probability of toxic symptoms because of bromide retention.

PATHOGENESIS

Bromide is rapidly absorbed from the stomach and intestines. It exerts a moderate but lasting depressive effect upon the whole of the central nervous system except the medulla. The mind

is less alert, the special senses less keen, and less attention is paid to what is going on. The motor areas are also depressed, voluntary motion being sluggish. The reflexes are depressed, and consequently there is a general depression of muscular tone throughout the body. These pharmacological effects are, of course, grossly exaggerated in bromide intoxication.

Bromide is eliminated slowly, much more so than chloride, consequently there is a tendency to a cumulative effect. The bromide ion is able to replace the chloride ion in the tissues and in the blood, leaving the sodium chloride free to be excreted. Thus the urine under bromide therapy shows excess chlorides. On the other hand, the excretion of bromide is accelerated by the ingestion of large amounts of sodium chloride, and this fact forms the basis for the specific therapy of bromide poisoning.

Although bromide is absorbed rapidly, it does not necessarily produce its toxic effects at once. Bailey[7] states that a bromide eruption may first appear weeks, or even months, after a bromide was taken. The following case had no skin eruption, but illustrates the delayed appearance of symptoms of intoxication long after bromide therapy had been stopped:

CASE 5

Mrs. F.S., aged 61, was admitted to hospital October 23, 1940, because of mental confusion and emotional instability for one month. For two weeks she had been dizzy and sleepless and finally fell while going to the bathroom and injured her head and back. The only information obtainable with reference to medicine taken was that she had been given a "sedative tonic" in the O.P.D. clinic eleven weeks before. Careful inquiry revealed that 330 gr. sod. bromide in all had been prescribed and no evidence was found that this had been exceeded. The serum bromide on admission was found to be 97 mgm. (126 sodium bromide) per 100 c.c. Sodium chloride gr. xlv per day was prescribed and one week later the serum bromide was 53 mgm. At the end of the second week the value was 26.6 mgm. The patient made an uneventful recovery.

DIAGNOSIS

An accurate history is of the greatest aid in diagnosis or, rather, in suggesting the diagnosis, for the final word must be said by the laboratory. Frequently the patient is in no condition to co-operate in obtaining a history, and the relatives and friends or previous attendants are often essential in furnishing the key to the situation. However, even in the absence of any history, the alert physician will be quick to recognize the possibilities when he sees a patient in an otherwise unexplained toxic delirium. The symptoms of mental confusion and retardation, slurring of speech and reeling gait, together with a coated tongue and foul breath provide a clinical picture which is extremely suggestive, and, with a history of taking bromides, is sufficient for a working diagnosis. With modern clinical laboratories under government, university or hospital control, throughout the country, it is a simple matter to submit a specimen of blood and establish the diagnosis beyond reasonable doubt. A real difficulty, however, arises from the fact that many of these patients suffer from a psychosis, or psychoneurosis prior to the onset of the bromide psychosis. This primary condition is often the reason why bromide medication was resorted to. It therefore behoves anyone dealing with such a situation to bear constantly in mind the possibility of complicating the clinical picture by the treatment. Furthermore, such a complication will naturally influence the course of treatment for the bromide intoxication, inasmuch as the improvement on eliminating bromide from the body will be less dramatic if one has still to deal with the original condition.

PROGNOSIS

Under suitable treatment, cases of bromide intoxication usually recover in two weeks to two months. Nevertheless, the condition is not without serious danger, and one of our cases died after transfer to the Toronto Psychiatric Hospital, and one died on our own wards nine days after admission:

CASE 6

Miss M.M., aged 37, was admitted June 6, 1941, with disorientation and in a semi-comatose condition. She was brought to hospital by the police who found her wandering about the streets in a dressing gown, unable to answer questions. We were eventually able to learn that she had been taking bromo-seltzer. On admission the blood bromide was 283 mgm. (364 mgm. sodium bromide) per 100 c.c. The non-protein nitrogen was 40 mgm. per 100 c.c. The spinal fluid was clear, 6 cells per c.mm., pressure 115 mm. water, protein 58.5 mgm. per 100 c.c.; Wassermann test negative, colloidal gold, negative. An electrocardiogram on June 12th showed a flat T.1, and depressed S.T.2, 3, suggestive of previous digitalization. The spinal fluid proved sterile on culture.

Sodium chloride gr. xv t.i.d. was given and the serum bromide gradually fell to 96 mgm. on the day of death. There was no corresponding improvement in the clinical condition, but on the contrary, restlessness increased and the stupor deepened. Signs of bilateral bronchopneumonia appeared on the fifth day and sulfathiazole therapy was instituted. Her condition gradually deteriorated, and she died on June 15th, nine days after admission. Permission for autopsy was not obtained.

TREATMENT

Prophylactic.—Where bromides are being prescribed the physician should be on the alert for evidences of intoxication. To avoid the risk of self-administration, all prescriptions containing bromide should be marked "not to be repeated", thus requiring a new prescription each time the supply is exhausted. It is a wise precaution in all these cases to see that the diet contains additional sodium chloride unless it is definitely contra-indicated. This is especially important in cases of epilepsy who may be placed on bromide therapy for long periods of time.

Therapeutic.—It is imperative, of course, that once the diagnosis is made or suspected, the administration of bromide be stopped immediately. Care must be taken to ensure that its surreptitious use by the patient is rendered impossible. In dealing with maniacal patients, it may be necessary to quiet them by the use of hydrotherapy, or one of the barbiturates. One must always have in mind the probable influence on the behaviour of the patient of the underlying condition which originally gave rise to the use of bromides. Fortunately, we have at our disposal very definite means of hastening the excretion of bromide from the body. The administration of sodium chloride results in the displacing of the bromide radical and its prompt excretion. The usual dose is 15 to 30 gr. three times a day. Some authorities favour giving the salt intravenously in the form of 500 to 1,000 c.c. of normal saline daily for 4 to 5 days. It has been said that care must be taken in certain cases, not to liberate the bromine too rapidly for fear of increasing the toxic symptoms, but I have not observed this.

An adequate intake of fluid is essential to the general well-being of the patient, and, through its diuretic action, it hastens the excretion of the bromide. The daily intake should approximate 2,500 to 3,000 c.c. It is not necessary to resort to intravenous administration if the patient will swallow.

SUMMARY

1. Attention is called to the relative frequency of bromide intoxication.

2. The dangers of self-medication, particularly with preparations whose names do not suggest bromide as an ingredient, are emphasized. Where bromide is indicated in treatment, physicians are urged to keep the possibility of toxic effect in mind and to mark each prescription "not to be repeated".

3. The symptoms and signs, laboratory findings, pathogenesis, diagnosis and treatment are outlined. Factors likely to precipitate the condition are mentioned. Illustrative cases are cited.

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RÉSUMÉ

Il faut se méfier des préparations sédatives non identifiées; elles contiennent parfois des bromures et l'intoxication par les sels de brôme est assez fréquente. La symptômatologie va de la céphalée et de l'anorexie jusqu'aux tremblements, à la dysarthrie et aux hallucinations. L'éruption cutanée peut faire défaut ou ne survenir que très tardivement. Le pronostic est le plus souvent favorable si le traitement est institué à temps; celui-ci est basé sur le déplacement de l'ion *Br.* par l'ion *Cl.* Toute prescription contenant des sels de brôme devrait porter la mention: "Ne pas renouveler."

JEAN SAUCIER

TECHNIQUE IN LABOUR*

By Geo. M. White, M.D., M.R.C.O.G., F.A.C.S.

Saint John, N.B.

I MAKE no apology for dealing with the subject of technique in labour, or, better still, what I might call the conduct of normal labour, because I am fully aware that most obstetrical cases in New Brunswick are conducted by men in general practice and in the homes. It has been stated that 51% of the deliveries in United States in one recent year were conducted in the homes, and if that be so in a country with so many large and small cities, with many hospitals, the percentage in New Brunswick would be even greater.

I believe that the first requisite in the conduct of normal labour is a knowledge of the patient prenatally. I hope you will not think that this is ideal but not practical, because I am sure it is practical, like all things worth while, but it is only possible if one works for it; it is a matter of education, and I am sure that patients visit their doctors for prenatal care more frequently now than they did twenty or even ten years ago.

* Read before the New Brunswick Division, Canadian Medical Association, Fredericton, N.B., June 15, 1942.

What should one know about a patient prenatally in order to better conduct her labour? From her history we gain important knowledge, such as her age and her parity. I need not go too deeply into these things, for we all agree that age has a bearing and that the woman about to be delivered of her first baby in her late thirties or early forties runs a definitely higher risk both for fetal and maternal morbidity and mortality than the young woman in her early twenties.

As to parity there should be caution, as I fear we all at times feel that if she is a multiparous woman she will be all right. It has been definitely shown that after the fourth pregnancy the risk begins to go up and after the eighth there is a marked rise. Let us not give ourselves false comfort by saying that we have a patient who has had so many babies and never had any trouble, for we are putting an isolated experience against the average of the many.

The next point in the history is the background as revealed by the family history and history of past illnesses. There are a number of things that may be of help in the family history. There may be a history of tuberculosis, of toxic goitre, of hæmophilia, which are warning signals of conditions to be watched for.

The personal history may include tuberculosis, rheumatic fever with possible heart involvement, scarlet fever with possible kidney damage, and so on, so that we can well invest a little time in this history.

Then we come to the menstrual and sexual history; when did she start her menstrual life? how long are the average period cycles? how many days does she flow? how much does she flow? has she much menstrual pain? What bearing does all this have on her labour you say? A great deal, for they are the external evidence of her sexual functions; the woman with the low ovarian function, a long menstrual cycle, scanty flow, dysmenorrhœa, is likely to have a less satisfactory labour than a woman who is normal in every way.

Then, has she had babies before and what is the history of these labours? Surely this is important. Contrast the woman with a history of, say, two normal spontaneous labours with the one who has already had two long drawn-out labours with instrumental deliveries. The history of normal labours however should not beguile us into a sense of false security; these previous normal labours are a good insurance, but not a guarantee of safety. Of course a history of previous toxæmias, such as vomiting, albuminuria, œdema, headaches, or even convulsions, are all valuable guides as to how to conduct not only the prenatal care but the labour as well.

And then we come to the existing pregnancy, the date of the last menstrual period, with the approximate date of delivery, and we all think in terms of so many days; 280 days is the *average* time. Let us remember that pregnancy is not a matter of so many days but of a *process* that takes, on an average 280 days, and that a woman with a long menstrual cycle will probably take a little longer than the average. Rather than try to go into all these variations tell her that her minimum date is so and so and that she will have her baby in the two weeks following that date. If she comes before that she is a little premature, if she goes over that two weeks, and very few will do that, she is beginning to be a little overdue. The history of the present pregnancy may have a great deal to do with the conduct of the present labour. Has she signs of toxæmia or not? Has she any bleeding, or signs of inflammatory reactions?

I have spent some time on the value of the history because I feel that as we improve with our laboratory and mechanical helps we must never lower our standards of history taking, that the history becomes increasingly important as the years go by.

We now come to the physical examination, which is as important as the history. The patient is entitled to your best care and thought, and you owe it to her as well as to yourself to be careful in this examination, which consists of two main divisions, the general and the obstetrical. In the general examination one looks for gross lesions and also for smaller correctable lesions. If there is a mitral stenosis, or an active pulmonary tuberculosis, or a chronic nephritis, our care of the patient and her labour will be certainly influenced by this knowledge; if we find dental caries, or other foci of infection we should certainly attempt to clear these up. Just a word about the care of teeth during pregnancy. It is legendary for older women to tell younger women that as soon as one is pregnant nothing can be done about the care of the teeth. This of course is not true. During pregnancy the teeth require more care than ever; in addition to the usual good care, they should be in-

spected and supervised by a dentist, with extra calcium in the diet as well.

A careful general examination should be followed by a careful obstetrical examination. We examine the breasts and give instructions as to their care; then we examine the abdomen and decide whether the uterus corresponds in size with her period of amenorrhœa. If she has come early as we wish patients to do, the lie of the fetus and its adaptability to the mother's pelvis cannot be decided at first.

We now come to external measurements, and here we are on controversial grounds. There are men, and good men too, who do not bother doing them; they say they are of no value to them and so waste time. I for my part do not believe that they are of great value in themselves, but I do believe they are of value and worth doing because they help one to be careful and thorough. We are in danger of doing too little rather than too much, and for my part I believe these are signposts and guides. I am sure if I were walking along a road and was not sure of my direction, I would be guided by the road signs, even though I had not been over that way before and was not sure they were accurate. So I teach these measurements and make them, remembering always they are only guides and not the most important part of the pelvic measurements.

Then one comes to the pelvic examination. Here one can find out a great deal, if one is careful and thoughtful. Let us think in terms of the bony pelvis and the soft tissues, rather than in terms of the order that we feel these things.

The bony pelvis must be carefully studied. The width of the outlet is very important. I have heard good obstetricians say they were more interested in the outlet than in the inlet of the pelvis; that the inlet would take care of itself but the outlet would not. I do not believe that I can subscribe to that entirely, but I do believe that the outlet is very important, and many things can be found out about it because it is so accessible to examination.

The transverse measurement of the outlet is important, but do not be satisfied with this alone. Feel the thickness and the inclination of the symphysis, as well as the angle of the arch of the pubes. Some women have a high thick symphysis, sloping forward, and a narrow angle of the pubes, and in the lithotomy position it is hard to see into the vagina. If in the lithotomy position you cannot see her anus well you have a woman with a difficult outlet.

Next, her interspinous measurements correspond almost always with her outlet. If this region is also narrow it produces many of the difficulties of labour. Here is where there is failure of rotation and descent, and this knowledge will influence your conduct of labour later on.

And then we examine the brim of the pelvis or the inlet, the A.P. diameter, the transverse diameter, and the obliques, as well as the general shape and contour of the pelvis.

There is some difference of opinion as to when the internal examinations should be made; some make them at the first visit, others, not until the seventh month or thereabouts. I do not think that when you do it is as important as that you do it carefully, and mark it down plainly on your record. If there is any abnormality, make some kind of mark on your record to draw your attention to it when the time of labour comes.

The examination of the soft parts is important, the type of perineum, the health of the inlet and the vagina; the cervix, its condition as to health and repair; the size and position of the uterus, the presence or absence of tumours or cysts of the vagina, cervix, uterus or appendages which might interfere with labour.

Then there are the subsequent visits, at which we follow the temperature, pulse, respiration, blood pressure, weight and the urine, as well as the patient herself. How does she look? How does she feel? Is her elimination satisfactory? With all our tests, let us never forget her as an individual. We watch carefully for any disproportion as pregnancy approaches the last month and weeks.

Give her ordinary instructions regarding diet and medication. There are one or two points that are very important. Many women believe that when they are pregnant they should eat no meat. We know that our daily requirements demand a certain amount of protein, and if this is not present then she breaks down her body proteins and so depletes herself. She should have a normal balanced diet plus extra calcium, best taken in the form of good milk with adequate vitamins. During the latter months of pregnancy the fetus stores a great deal of iron; this fetus is a parasite and withdraws the iron whether the mother can well afford it or not. It is very important that the mother's red blood count and hæmoglobin should be well within

normal limits after the baby is born. I feel this is one of the best protections against infection, as I have yet to see a woman with a severe overwhelming post-partum infection who had a high red blood count and hæmoglobin. So supply her with plenty of iron.

One point I did not mention in the history that I think is important is some information regarding the husband. So often the big tall good-looking girl marries a short small man. That is all right, but when the small doll-like girl picks herself the college football hero, things may be different, I always ask her about her husband; how tall is he, how much does he weight, and what size hat does he wear? If she cannot answer she finds out and tells me next time. This may be an important factor in the matter of disproportion.

Up to now we have been talking of prenatal care and preparation for labour. If there are abnormalities such as toxæmia, or bleeding, or disproportion, we may need to interfere, but that is a subject for another day.

Instruct the patient as to the onset of labour, the type and character of labour pains, the possibility of appearance of show or rupture of membranes, and the danger of frank bleeding. This type of instruction will save both the patient and the doctor worry.

I believe that the outstanding dangers in any labour are—to the mother, infection and hæmorrhage, and—to the infant, intracranial hæmorrhage or injury and suffocation. I believe that infection is the greatest single factor in converting an otherwise normal labour into an abnormal one. Whether we like to admit it or not the birth canal is injured in every labour. This may be very severe or only minor, it may be in the perineum, in the vagina, or the cervix, or even in the placental site, in every case it is a possible nidus for infection. I am well aware that a woman may have a spontaneous labour without examination, or handling and yet have a severe infection, but that is much rarer than the woman who has a smallish pelvis and is examined too much and develops an infection afterwards.

So often we who practise mostly in hospitals are told or asked why it seems that more infections occur in hospitals than in the homes. This all goes back to the kinds and modes of infection. There are the endogenous infections that the patient carries around with her, which foci of infection we try to clear up during our prenatal care, also to which she has built up considerable immunity, and these are far less in occurrence than the ones she receives as a present while she is in labour, from those in attendance.

Let us as physicians never forget, or be too modest, to warn her as she nears term, of the dangers of intercourse. I have seen a few severe infections from this source. We in attendance must keep in mind the fact that we must not do anything that will infect her. The infection can come from our hands and does sometimes, either from improper cleansing of our hands or from breaks in our technique, but more often it comes from our nose, throat or mouth. This infection may be by contact or it may be air-borne, I believe we are more conscious of contact possibilities than we are of air-borne infection, and yet I believe they occur in inverse ratio.

During the first stage the patient must be prepared; this consists of shaving the vulva from the mons downward, over the labia and down to and around the anus. She must have her bladder and bowel emptied and she must be thoroughly cleansed. When I say thoroughly cleansed I do not believe there is anything that takes the place of soap and water. After that you can use whatever you like. There are many antiseptics, and it does not matter much which so long as you do not burn her. In all this do not forget the cardinal principle that you must not introduce into her birth canal any infection either her own or yours.

How much should you examine her in the first stage? Only as much as is necessary. If you have seen her a few days before and the head was well engaged and no disproportion, and when you arrive she is in good labour, with the head well engaged there may be no need to do even a rectal; if the head is in sight it certainly is not necessary. If these conditions do not obtain do a rectal and if once gives you enough information, well and good. If as labour goes on you feel you need to do a vaginal I have no objections, if it is done with proper preparation of both yourself and the patient, but when I walk into a patient's room in a hospital to examine her and the nurse on being asked for a glove inquires whether I wish to do a vaginal or rectal examination I do not blame her, but I feel there are still some of us who make no more preparation for one than the other.

Must she stay in bed during the first stage? Not necessarily. Whether in hospital or home

we must be guided by the labour itself; she must not go to extremes; she must not walk until she is fatigued. When the pains become severe so that with each pain she must be held up by attendants it is not wise to be up.

What about sedatives? The time of giving and the amount will be decided in each case, by the type of labour as well as by the patient's threshold for pain. I believe there is greater danger in overdosing than in giving too little.

During the first stage adequate attention should be paid to the intake of fluids as well as food. This stage in many women lasts 18 to 24 hours, so these things must be kept in mind. During this stage we keep a close watch on the fetal heart rate and rhythm, in spite of the fact that in the presence of any irregularity there is very little that we can do about it other than the judicious use of sedatives to control a too severe labour.

I should not leave the first stage without discussing that controversial point, the use of pituitrin during the first stage. I feel very strongly on the matter, both from personal experience and from reading. The former probably influences us all more and the latter is probably more accurate, as it is the experience of many as compared with our own. I am satisfied that it has been established that pituitrin in the first stage is always potentially dangerous.

It is dangerous in more than one way. First, because we are not sure of the response of any given uterus to the drug. We may and do give this drug in minimum doses to induce labour, and there are plenty of reports of cases in which the uterus goes into tonic spastic contractions with a minimum dose. Once this happens there is little that you can do to relieve it and severe damage may be done to the fetus as well as to the mother. Again, there is a very great difference between the extracts of the different companies with a great difference in response to the various products, so that if you have been using the weaker drug and knowingly or unknowingly give the stronger you may get into serious trouble.

So far I have talked of the use of pituitrin in inductions only, but to be brave enough to give it in the presence of a weak or unsatisfactory labour in the first stage is mentioned as a warning, because I believe there is then a risk of severe injury to the mother or baby, or both.

The first stage is finished when the cervix is fully dilated. This is an academic definition, and it is some times difficult to tell when it occurs clinically, but when it does and the head begins to go through the cervix and descend the birth canal two things happen. It is one of the most painful times of labour and is often accompanied by vomiting; and also at this time the patient begins involuntarily to push down. This is the first time that it is correct for her to push down. She can now be coached how to hold her breath and push down towards the back in exactly the same way she would to overcome the resistance of passing a difficult stool.

So long as progress is satisfactory as little rectal or vaginal examination as possible should be done. When the presenting part is on the perineum and the perineum is stretching well one must use judgment in the treatment of the perineum. It is not enough that the perineum, or at least the mucosa, of the perineum does not tear, for the mucosa will stretch much better than the transversus perinei, and if these are allowed to stretch so much that they are torn, then afterwards we will have a weakened perineal body with its accompanying lack of support to the posterior vaginal wall and the anal canal.

So it is better to incise and properly repair a perineum than allow it to be damaged too much. The head is born by extension and the shoulders and body should be born by pressure from above, preferably by the normal uterine contractions, or, if that is not forthcoming, by fundal pressure and not by pulling on the baby's neck.

All during this time of the second stage we have been following the same rules as before, in that we have been protecting the mother from infection, handling her as little as is compatible with safety, keeping her bowels and bladder empty, and only interfering when there are fetal or maternal indications. Here we again watch the fetal heart rate carefully, because here we can quickly interfere in the interest of the fetus if it is necessary. The old rule that there should be no interference until the cervix is dilated or dilatable holds good.

Before going on to the third stage I think it is a natural place in the sequence of events to discuss here too the immediate care of the new born.

At the beginning of this discourse I said that the two risks for the baby were intracranial injury and suffocation. What then shall we do to side-step these possibilities? We must handle our newborn very carefully, so as to not cause

any intracranial injury or to increase any already there and we must make sure that the baby's throat is cleared out. To put these into practice let us gently aspirate the mucus out of his throat with a soft rubber catheter, allowing the cord to pulsate until it stops which means two or three more ounces of blood for the baby and less weight loss afterwards. Let us if necessary place him in a warm tub, and, with careful handling, induce him to breathe, and let us not be wrong to the extent of holding him up by the feet and pounding him, because if he has by the merest chance some intracranial injury that is a good way to increase it.

Then his eyes should have, according to law, a drop of 1% silver nitrate solution and be washed out. This can be done at once or in the next few minutes. So he is placed in a warm place and kept under constant supervision for an hour.

The third stage is the time when the second major risk to the mother comes into play, that of hæmorrhage. The risk of infection is now even greater than ever in that the birth canal is lying wide open from the introitus right up to the placental site, so that we have to redouble our care here against infection, and we have the added risk of blood loss.

For the last two years I have been measuring blood losses as accurately as possible, and have been amazed at times at how wrong our estimated losses can be. I am convinced of this, that uterine constrictors, given either intramuscularly or intravenously at the end of the second stage, cut down blood loss and have caused as yet no complications such as retained placenta. This at least is true, that the blood loss is definitely lessened if the attending physician will watch the separation and as soon as the placenta is off, if the patient cannot expel it, which is not often, then express it.

In obstetrics hæmorrhage takes precedence over everything else. If the wound is bleeding then the repair may have to be started first; if not, then only as much should be done as can be done until the placenta is off, and as soon as this occurs it should be delivered at once. Then finish the repair. In other words the proper conduct of the third stage is more important than the repair.

What must we do in the presence of bleeding or hæmorrhage at this time, if the placenta is not off and the blood loss going on cannot be controlled by ordinary methods of pressure of the uterus with one hand on the fundus and the other on the cervix, then the placenta will have to be removed manually. It is understood of course that the usual uterine constrictants have been given. With the placenta removed and the bleeding not yet controlled I have no hesitation in placing in the uterus an acriflavine, dettol, or even a dry pack. Then, when it is all over, do not be stingy with your sedatives, give her a good rest the first night post partum.

Now, in conclusion, if we are to be successful with our obstetrics we must approach our labours on the ground that every labour is a complicated series of physiological processes, and that so easily can these go wrong that every labour is a potential major surgical risk. Nature is careful of the race as a whole, but is careless of the individual, and we as physicians must be careful of the individual.

SUMMARY

1. Know your patient well, both her past and her present history and her present physical examination, including her obstetrical examination.

2. Have as good an idea of what to expect before labour begins as possible, so that if she has a posterior position you can expect a long labour, or if her outlet is narrow you will not let the second stage go on after she has done all she can.

3. Protect her at all times against the possibility of infection. Give her the same surgical consideration you would in a laparotomy, and many infections will be averted.

4. Be ever on the alert for fetal distress and be ready to interfere in the interest of mother and baby if necessary.

5. Resist the temptation to do meddlesome obstetrics, by uncalled-for interference in order to have labour over as soon as possible. This may be by the use of drugs or forceps.

6. Be ever on the alert for hæmorrhage, and be ready to treat it at once and efficiently.

7. Be gentle in your resuscitation of the baby.

RÉSUMÉ

Il est important de bien connaître le mère avant la naissance de l'enfant, tant au point de vue physique général qu'au point de vue obstétrical. L'accouchement sera d'autant mieux dérigé que l'on aura plus de détails sur la position du fœtus et sur la conformation du canal pelvien. Songer toujours à l'état du fœtus, et cela, aussi constamment qu'à celui de la mère. Réduire les manipulations au strict nécessaire. Donner toute médication à bon escient et en temps opportun. Surveiller l'hémorrhagie et y apporter la thérapeutique appropriée. S'il faut ressusciter l'enfant, ne pas utiliser de procédés trop brusques. JEAN SAUCIER

CARDIAC PAIN

By G. F. Strong, M.D.

Vancouver

ONE of the common symptoms that require medical attention is chest pain, and to many patients pain in the thoracic region, particularly if it is left-sided, is regarded as of cardiac origin. It is obvious that of those with chest pain who consult their doctors, relatively few have a real cardiac basis for this distress.

Pain in the chest may be in the chest wall and be due to such diverse conditions as intercostal neuralgia, myalgia, herpes zoster, and, rarely, neurofibromatosis, mastitis or mastodynia, as well as inflammation or disease of the ribs, cartilage or fibrous tissue. One of the commonest disorders of this sort to cause confusion with real heart disease is the radiculitis resulting from irritation of the dorsal nerve roots caused by arthritis or peri-arthritis of the vertebral articulations themselves, or the joints between the vertebræ and ribs. This distress may closely simulate angina even to the point of being brought on by exertion and relieved by rest.

Visceral disease other than heart affections causing chest pain includes lesions of the pleura, especially diaphragmatic pleurisy, in which no tell-tale rub may be elicited, and pulmonary involvement including pneumonia, bronchogenic carcinoma, and embolism. In passing, it should be noted that the larger pulmonary infarcts often closely resemble cardiac infarction. The œsophagus may be the source of chest pain as a result of inflammation, stricture, spasm or neoplasm. Mediastinitis or mediastinal tumour must also be kept in mind. Even the stomach may be responsible, and one of the commonest causes of diagnostic error is the presence of a diaphragmatic hernia which must always be kept in mind and excluded by careful and special roentgenological examination.

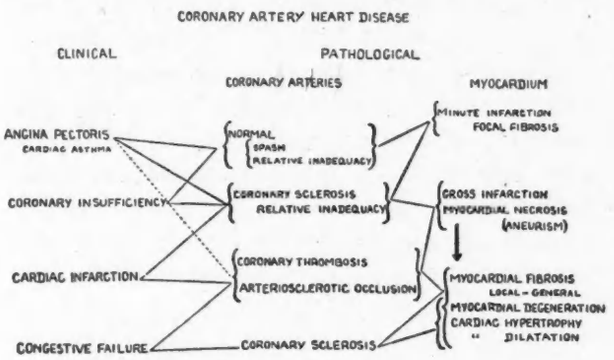
It is of course, possible that peptic ulcer and gastric carcinoma particularly involving the cardiac end of the stomach may cause pain in the chest. The relation of chest pain to gall-bladder disorders is also to be remembered.

Of the heart lesions causing pain are to be mentioned the apical ache associated with cardiac fatigue in valvular disease and the pain of pericarditis, aortitis and aneurysm, particularly dissecting aneurysm. Probably the commonest of all cardiac pain is that associated with functional heart disease, neuro-circulatory asthenia or cardiac neurosis. This pain is sometimes lancinating in character, usually apical in location and transitory in duration, but it may, at times, simulate that due to any form of organic heart disease. The most serious and significant cardiac pain is that due to coronary artery involvement and in the time limit permitted it would seem wise to restrict our discussion to that type of pain. Certain features of this pain should be stressed. It is practically always substernal in location and this is so true that the diagnosis of pain due to coronary artery heart disease when the pain is apical or vaguely precordial in location is to be made only in the face of other incontrovertible evidence. This is not to deny the well known fact that on occasion pain of angina or infarction may be referred to some distant area such as the chin, the neck, the point of the shoulder or even the elbow.

In any consideration of pain it is essential to determine the type of individual concerned. A mild distress to the hyposensitive might be described as excruciating pain by the hypersensitive patient. There are various tests by which it is possible to ascertain a patient's reaction to ordinary stimuli. Information is also secured from a carefully taken history that will indicate the type of individual with which we are dealing. Occasionally, the reaction of the patient to so simple a procedure as the taking of the blood pressure may in itself give us the desired information, while further insight into this question comes from the reaction to venipuncture, etc.

Granted that we are dealing with pain due to coronary artery heart disease, it becomes important to have clearly in mind the various disturbances of coronary circulation which may cause such pain. Parenthetically, it is also important to remember that any of these coronary conditions, even cardiac infarction itself, may occasionally occur without pain. In order to orient ourselves to the whole problem of arteriosclerotic heart disease it is well to remember that angina pectoris, cardiac infarction, and the congestive failure due to coronary sclerosis are all phases or manifestations of one disease process. This is schematically shown in the accompanying diagram in which on the left are listed the clinical diag-

noses that may be made, while on the right the pathological findings, as to first the coronary vessels and second, the myocardium, are set out. This is, of course, not an attempt at a complete picture of all the details of this complex disease, but rather a rough diagram of only the highlights of the important features. In no sense is it intended to convey the suggestion that the clinical features are mutually independent or separate conditions, since quite the reverse is true and angina



pectoris, for example, may be followed by, or follow cardiac infarction, which may in turn terminate in congestive failure.

The painstaking investigations of Blumgart and his associates[1] have added much to our knowledge of the true relationship between clinical diagnosis and pathological findings in coronary artery heart disease.

There are certain features of this diagram which may well be emphasized. Angina pectoris may occur in patients with normal-looking coronary arteries, and in these cases it is generally assumed that the effort pain resulted from spasm of these vessels, or at least from the fact that they had lost their ability to dilate in response to the increased demands of exercise. However, in careful autopsy studies of uncomplicated angina,[1] most of the cases show more definite coronary changes, usually occlusion of more than one main branch or a very real coronary inadequacy resulting from the fact that in instances of hypertrophy from either valvular disease or hypertension, there has been no increase in the coronary supply to the increased muscle mass. Multiple minute infarctions with subsequent focal fibrosis are often found in cases not showing gross infarction.

Farther along the scale of painful coronary disorders is typical infarction, in which the pain is much more severe in character and longer in duration, and in which a coronary occlusion, either thrombotic or arteriosclerotic, is usually found. Due to the studies already mentioned,[1] we have recently acquired a much better understanding of the pathological changes associated with infarction. We now know, for example, that the site of the coronary closure bears no necessary relation to the location of the infarct, as it has been shown that sudden occlusion of the left coronary may result in infarction of the area of the heart muscle supplied by the right coronary or vice versa. This is possible because of the extreme variability of the collateral circulation, a fact which also explains the finding of complete coronary occlusion without any concomitant infarction, as well as the less common occurrence of gross infarction in the absence of demonstrable coronary closure.

The pain of infarction is now well recognized and in a typical case diagnosis is not difficult. Associated with or following the pain there is shock with rising pulse and falling blood pressure and later pyrexia, leucocytosis, an increased sedimentation rate, occasionally a pericardial rub, and, usually, typical electrocardiographic changes. These latter may be found only when serial tracings are taken, a procedure that should be followed when the opportunity is available and if doubt exists. In passing, it might be mentioned that serial tracings mean a tracing every day or every two to three days during the period of doubt and not, as some of our over-enthusiastic cardiologists suggest, every two hours! Even with serial tracings a certain number, variously estimated at 20 to 30% of patients with undoubted infarction, will fail to show definite or typical cardiographic changes. Studies have shown that infarction can occur without demonstrable coronary plugging, and this is most likely to be found in instances in which sudden extra strain is thrown on the heart, as in postoperative states, in paroxysmal tachycardia and the like. While it is true that in most cases showing infarction at autopsy, a corresponding coronary occlusion can be demonstrated it is important to remember that definite and even sudden occlusion of a large branch of a coronary artery may occur without a resulting infarction.

Midway between the transient pain of angina and the prolonged, severe pain of infarction, is another clinical condition only recently differentiated and at present called coronary insufficiency or coronary failure. In these cases

the pain is more severe and more prolonged than in angina, but the signs of infarction, such as fever, leucocytosis, increased sedimentation rate and the electrocardiographic changes do not occur. First thought may suggest that there is little importance in the careful differentiation of these conditions, but more consideration will indicate that such is not the case. Actually, our main concern is to distinguish coronary insufficiency from cardiac infarction. The ordinary treatment for cardiac infarction entails a rest in bed of 6 to 8 weeks and a like period of convalescence, while for coronary insufficiency a few days to a week or 10 days' rest may be all that is required. When we consider all the devastating effects on the wage earner of an enforced idleness of two to three months' duration, it becomes a matter of great community importance that we make this clear distinction.

Anyone seeing many cases of coronary artery disease must have been struck by the instances of what we formerly called infarction, in which there were surprisingly few evidences of serious illness, and in which the physical signs of myocardial necrosis, fever, leucocytosis, increased sedimentation rate were notably absent. After all, the clear-cut clinical concept of cardiac infarction has only become established in the last twenty-five years, and it took the first 10 to 15 years of that time to diffuse this knowledge throughout the profession. The concept of a clinical entity, called for convenience, coronary insufficiency, standing midway between angina pectoris and cardiac infarction is among the latest additions to our knowledge of this type of heart disease. Many will, therefore, I feel sure, have shared my earlier experiences and have kept some of these patients in bed for the full period required for the healing of an infarct, when as a matter of fact no infarction had ever occurred. In emphasizing the necessity for keeping the possibility of coronary insufficiency in mind, we must not forget that it is better to err on the side of safety and, if there is a doubt, to treat the patient for infarction.

As to the last clinical type of coronary artery heart disease in our diagram, that causing congestive heart failure, there is little to be said here. In this condition the patient is presented to us in failure or decompensation, which was formerly attributed to myocardial degeneration or chronic myocarditis. The heart muscle does, of course, show degeneration, occasionally with infarction either minute or gross, but the basis for this myocardial degeneration is coronary sclerosis with resulting inadequate coronary blood supply. Where hypertrophy has developed as a result of the sclerosis itself or from valvular disease or hypertension, the degree of coronary inadequacy is increased.

Certain of our terms warrant more detailed attention. "Angina pectoris" should be reserved for the clinical condition in which substernal distress develops on effort or excitement and is relieved by rest or nitrites. It is a clinical diagnosis and may be associated with normal objective findings in both physical examination and laboratory investigation and with a variety of pathological changes, as for example, the coronary insufficiency may be only relative, or may be the result of actual occlusion of one or more main branches and an infarction may have previously occurred.

Since objective findings may be entirely normal, the diagnosis must be arrived at by exclusion, the commonest sources of error being the radiculitis associated with dorsal arthritis and diaphragmatic hernia and the pain associated with functional heart disease.

Coronary insufficiency would seem as good a term as any for the clinical condition in which the patient suffers severe, prolonged, substernal pain, like angina in location, but unlike it in not being relieved by rest or nitrites; and like infarction in duration and severity, but unlike it in not being followed by those evidences of myocardial necrosis noted above.

Cardiac infarction should be the designation reserved for the clinical condition characterized by severe, prolonged, substernal pain, associated with more or less shock and followed by such evidences of myocardial necrosis as fever, leucocytosis, increased sedimentation rate, occasional pericardial rub and typical electrocardiographic changes. The status anginosus of the older writers could represent either severe coronary insufficiency or cardiac infarction.

Coronary thrombosis is really a pathological diagnosis and should not be used as a synonym for cardiac infarction. As already indicated, thrombosis may cause infarction, but the latter can be due to arteriosclerotic occlusion without intra-vascular thrombosis, or may occur as a result of acute or persisting coronary insufficiency without any actual plugging of the lumen of the coronary arteries.

Coronary occlusion, while probably better and a more general term than coronary thrombosis, is for the same reasons not satisfactory as a clinical diagnosis. Let us as clinicians be satisfied to diagnose angina pectoris, coronary insufficiency or cardiac infarction and leave to the pathologists the decision as to whether thrombosis or arteriosclerotic occlusion be present. The use of such terms as a "coronary accident" or the loose use of "angina" for any heart pain should be avoided.

TREATMENT

While a discussion of pain seems incomplete without some mention of treatment, there is little new to be added to the established methods now available in recent textbooks. Certain features of the treatment of some of these conditions merit a brief comment. In angina the freer use of nitroglycerine in the form of the gr. 1/100 hypodermic tablet would seem indicated. Many patients are more comfortable if they are urged to take these not only for the relief of pain after it has developed, but also in anticipation of an attack. Some take 12 to 15 of these tablets a day for years without ill effect. The administration must be left to the patient and if he is assured that an increased use of these tablets will not hurt him, he may lead a much more comfortable life and even be able to carry on his ordinary activity. Nitroglycerine is more than a mere palliative remedy, since there is evidence that it increases coronary blood flow and should therefore give the patient some lasting benefit.

Recent reports have suggested the value of parenteral use of androgenic or œstrogenic substances in angina. This work is based on the fact that there is some evidence that these substances cause increased peripheral blood flow. The question as to whether they also lower an elevated blood pressure is not settled. Lesser[2] used testosterone in a series of 20 men and 4 women with angina and has reported favourable results in all cases. His method consisted of the intramuscular injection of 25 mgm. of testosterone propionate every two to five days depending on the severity of the attacks. Others have reported satisfactory results with an œstrogenic substance. Since this method of treatment seemed free of any untoward effect we decided to try it on some carefully selected patients at the Out-patients' Department of the Vancouver General Hospital. Only typical and uncomplicated cases of angina pectoris were selected. Patients with angina due to luetic aortitis or associated with diabetes were not included. The preparations used were testosterone propionate (perandren) and œstradiol dipropionate (di-ovocylin), both supplied by the Ciba Company. We have limited the use of perandren to men and the di-ovocylin to women. At first we tried the latter preparation on men, but found that it produced extremely annoying hot flushes.

The method followed was the intra-muscular injection of 25 mgm. of the perandren and 1.0 mgm. of the di-ovocylin every five days for 12 doses. The patients were first kept on careful observation for one to two weeks, during which time the only treatment they received was an ample supply of nitroglycerine with instructions to take a tablet each time they felt pain. They were asked to keep a daily record of the number of attacks of angina and of the number of nitroglycerine tablets used. The patients in this group were found to require from six to ten nitroglycerine tablets per day. After treatment and sometimes as soon as three to four injections of perandren or di-ovocylin had been given, the number of attacks of angina was less and the number of tablets of nitroglycerine required was correspondingly reduced. A side effect noted in a few instances was a surprising improvement in the sense of well being and a relief from the symptoms of arthritis. We have, up to the present time, treated six men and five women and the period of observation is too short to justify any conclusions. In only one case was it necessary to discontinue the injections because of a considerable aggravation of the angina. Whether the increase in heart pain was the result of the injections or coincidental it is impossible to say. The man is now in much the same condition as before injection treatment was started.

In coronary insufficiency where the diagnosis is certain only a short period of bed rest is necessary; more important is a re-adjustment of the patient's general activity to avoid over-strain and worry. The use of xanthine derivatives, especially aminophyllin, is indicated, as well as the other usual advice to patients with coronary artery heart disease.

In cardiac infarction the early indication is to relieve the pain. This may require morphine

and in large doses, though if oxygen is available the inhalation of 100% oxygen through a nasal or, better, a naso-oral type of mask, may reduce the amount of morphine required. Intravenous aminophyllin for this type of coronary artery heart disease has not been anything like as satisfactory as it is in cardiac asthma. However, when the patient has recovered from the initial shock, that is, after the first three to four days, the routine use of aminophyllin by mouth seems desirable. This is best given in an enteric coated three-grain pill two to four times per day. Other xanthine preparations as theobromine or theobromine sodium acetate or theophylline may be substituted. Rest in bed must be continued for 4 to 8 weeks depending on the size of the infarct as judged by the patient's reaction, there then should follow a like period of convalescence, after which a gradual return to activity may be permitted. Many patients go on to complete functional recovery, but the uncertainty of the prognosis is well known.

In conclusion, it is pointed out that, while representing only a small proportion of all those who think they have cardiac pain, those having distress due to coronary artery heart disease represent the most serious and most significant group.

This type of heart disease produces angina pectoris, coronary insufficiency and cardiac insufficiency and cardiac infarction and each should be readily distinguishable and so diagnosed.

Treatment with androgenic or œstrogenic substances may be of some value in angina pectoris.

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We are born with faculties and powers capable almost of anything, such at least as would carry us further than can be easily imagined; but it is only the exercise of these powers which gives us ability and skill in everything and leads us towards perfection.—John Locke.

TEACHING COMPATIBILITY TESTS FOR BLOOD DONORS

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IN time of war every doctor should be able to test a blood donor and be able to teach the art to his lay assistants. Recent years have brought forth rapid, accurate tests, whose simplicity lends them readily to teaching the host of defence force and civilian workers in the field of blood transfusion. Contrary to general belief, determination of the blood group is not essential for a blood transfusion. What is essential is a reciprocal compatibility test, sometimes known as a cross agglutination test.

RECIPROCAL COMPATIBILITY TESTS

The simplest of these is *the three drop test.* It comes from France where Jeanneney gave it first place. It was also independently discovered in Canada by Dr. Lloyd Morrow, of Metcalfe, Ont. (See Fig. 1).

Materials: clear glass slide, translucent glass plate, white tile, or in the home a white plate or dish; and some isotonic (3.8%) sodium citrate solution. If the latter is unavailable saline may be used in an emergency. A drop of citrate solution (3.8%) is placed on a slide, and on either side of it, a large drop of blood direct from patient's and donor's fingers respectively. The three drops are stirred together with a match or tooth pick and the slide rocked. The time-limit of reading is 3 minutes, when agglutination (shown in illustration), if present, will be visible to the naked eye in the thin part of the film when the slide is tipped. The test is invaluable in emergency surgery.

The next simplest cross agglutination test is done with *hæmolyzed blood.* It requires ethyl chloride, carbon dioxide, or the ice cube compartment of an electric refrigerator running at full cold. The test which, like the three-drop test, may be used as a "direct from the finger" bedside method, is performed as follows. The donor is brought to the patient's bedside or just outside his room door. With the end of a swab stick make two streaks of vaseline across a thin glass slide dividing it into three spaces. The patient is the *centre* of attention so place a drop or two of blood from the end of one of his fingers in the centre of the slide. At one end deposit some donor's blood. Pick up the slide

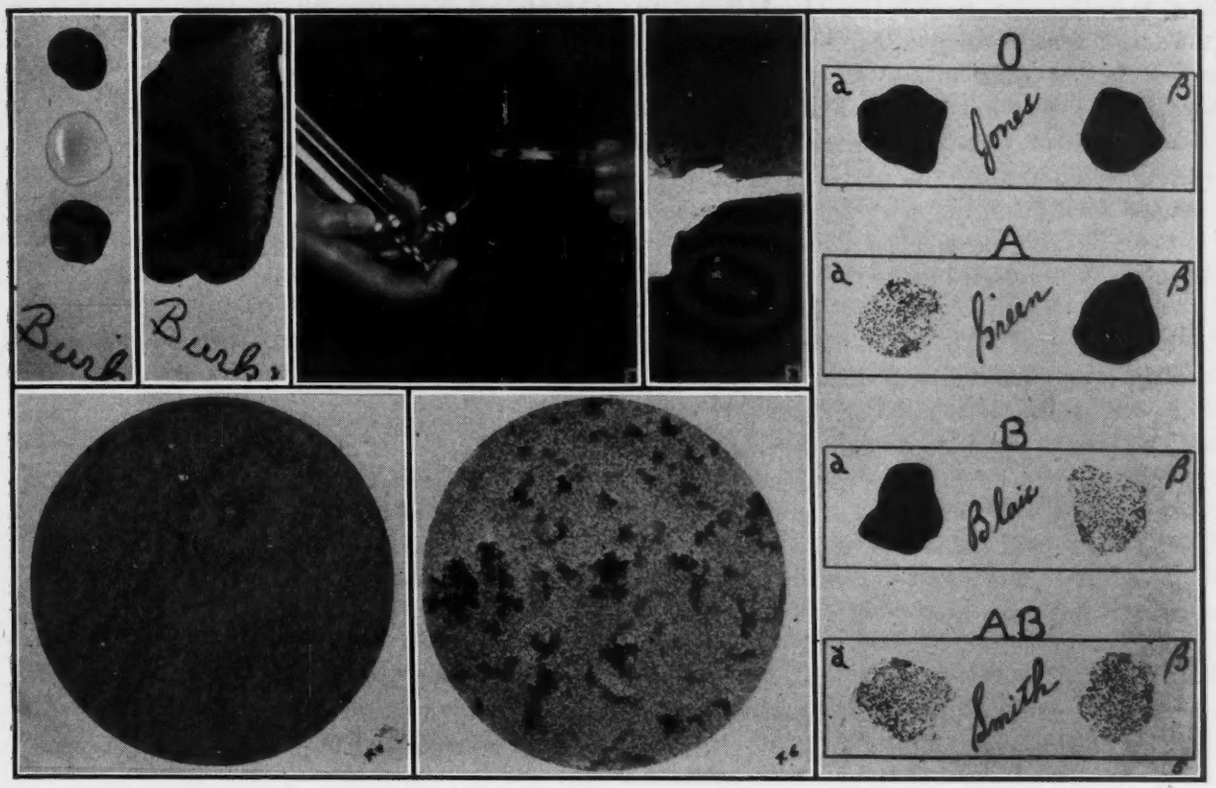

Fig. 1.—The three drop test. **Fig. 2.**—For cross agglutination tests, hæmolyzed blood is prepared more quickly than serum. **Fig. 3.**—The patient's hæmolyzed blood agglutinates the donor's cells. **Fig. 4.**—Left, low titre, safe. Right, high titre, dangerous. **Fig. 5.**—The blood groups, using the Von Dungern and Hirschfeld nomenclature. Note the simple direct reading in *all* groups.

by the other end and freeze both drops of blood by directing a spray of ethyl chloride against its under surface (Fig. 2). When the drops are frozen, add a droplet of 3.8% (isotonic) sodium citrate solution to the top of each, and quickly place the slide in some warm place, or hold it on the flat back of the hand, cup the other hand over it, and breathe on it with open mouth, to hasten thawing. Hæmolysis at once takes place and each specimen becomes a little pool of "red ink", with a little island of frozen blood in the middle. It is not necessary to wait till this central island is completely thawed before adding a fresh droplet of blood from the patient's finger to the specimen on the end of the slide and one from the donor to the patient's hæmolyzed blood in the centre of the slide. The specimens are each mixed with a toothpick or swab stick; or the needle used to prick the finger may be used, wiping it off with absorbent cotton between stirrings. The slide is gently rocked for a minute or two when agglutination, if present, will be visible to the naked eye (Fig. 3). It may be as fine as brick dust, or well marked. No agglutination means the bloods are compatible.

Using the centrifuge to obtain serum for testing causes unnecessary delay to both citizen donors and surgeon. However, if the blood specimen has been standing and some serum or plasma has separated, it is used instead of hæmolyzed blood.

If no compatible donor is available, a semi-compatible one (one whose blood agglutinates the patient's cells) may be used if of low titre.

A single titration of 1 to 5, which imitates what would happen in the patient's body, is enough to determine this. This procedure may be carried out with 5 drops of hæmolyzed patient's blood and one of the donor's whole blood on a white background, or it may be done microscopically as described by Coca as follows.

"Defibrinated (or citrated) patient's blood is drawn into a white cell counting pipette up to the 0.5 mark, the tip of the pipette is wiped off and saline solution is drawn in until the column of blood reaches the 1 mark, that is, ten divisions of the graduated stem. Saline and blood are expelled upon one end of a slide (avoid bubbles) and mixed with the tip of the pipette. After the pipette is thoroughly rinsed with saline, a similar mixture of donor's blood is deposited upon the other end of the slide. Two divisions of this thoroughly mixed 50% donor's blood are carried over with the pipette to the drop of ten divisions of 50% patient's blood and well mixed with it and this mixture is finally covered with a cover slip and observed for fifteen minutes with occasional slight movement of the cover slip."

No agglutination means the blood is of low titre and is safe to use (Fig. 4).

The above tests are used in dealing with relatives and friends who volunteer as donors. When none of these are suitable or available the determination of the patient's blood group greatly facilitates the selection of a probably suitable blood from a blood donor service or a store of refrigerated blood.

BLOOD GROUPING

Materials: glass slides, translucent glass plate or 4" white tile, tooth picks or applicator sticks, alpha (III, B, Anti A) and beta (II, A, Anti B) sera.

At the last International Congress on Blood Transfusion held in Paris in 1937 the Von Dungern and Hirschfeld nomenclature was adopted. It has since been adopted by the British Ministry of Health. It is a complete nomenclature. By it the groups are classified by corpuscle receptors designated by Roman capitals and plasma agglutinins designated by Greek letters thus O$\alpha\beta$ Aβ Bα ABo. When typing serum is labelled after its agglutinin content and not after the corpuscles it does not contain, the teaching of blood grouping becomes simplicity itself. *All* the readings are direct.

In practical work the names of the groups are abbreviated to the Roman capitals indicating the corpuscle factors (Fig. 5).

Blood which requires no matching. — This most desirable blood is kept on hand in limited quantities in some hospitals for the gravest emergencies. It is the blood of the Russian battle front. How the Russians prepare theirs we do not know, but such blood may be either low titre group O (Coca tested against A and B, or AB bloods) or group O blood to which A and B haptens have been added to neutralize the alpha and beta agglutinins. Haptens are receptors that are broken off and are free in the body fluids. These haptens are not as yet generally available.

High titre typing serum may be made from A and B Red Cross blood donations below the required 250 c.c. necessary for shipment. The sera may be titrated macroscopically on white 4 inch tiles.

When a sample of a patient's blood has to be sent to a hospital laboratory or to a distant point it is best collected in a small glass tube from a prick of the finger or ear; or by hypodermic syringe from a vein, and defibrinated by twirling an applicator stick in it for 5 minutes. Such blood may be used for any of the matching tests and also for the Laughlen syphilis exclusion test, which may be performed rapidly by using hæmolyzed blood.

My thanks are due to the Photographic Department, Ottawa Civic Hospital; to Muriel Clarke, Ottawa; Red Cross, for Coca test studies; and Mr. Arthur Kellett for microphotos thereof.

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PNEUMONIA COMPLICATING MILD RESPIRATORY INFECTIONS*

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ONE commonly hears it said of late that pneumonia is changing radically from that form seen years ago, and that one infrequently meets the old-fashioned pneumonia with its typical acute onset and clear-cut physical findings of dullness and bronchial breathing. According to most workers dealing with large series of lobar pneumonia, the pneumococcus is the excitant in about 90 to 95% of cases, the remainder being due to the streptococcus, Friedländer's staphylococcus, and mixed infections.

It is well known that both the incidence and type of infection vary considerably both clinically and bacteriologically in a given locality from year to year. It is also well recognized that the predominant type of pneumococcus is greatly influenced by the age-group under study, as well as whether the pneumonia is essentially of lobar or bronchopneumonic distribution. For instance, lobar pneumonia in adults is due mainly to pneumococci of Types 1, 2, 3, 5, 7, 8, and 14, with Type 1 leading, while the predominant organism isolated in bronchopneumonia of the same age-group is pneumococcus of Type 3, followed by the higher types. In children, in whom the pneumococcus is the presumed excitant in about 60% of cases of lobar pneumonia, the most prevalent is Type 1, whereas in infants the most frequent offender is pneumococci of Types 9 to 19, which are the types commonly found in the mouth of the general population, suggesting that in this group

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the infection arises by invasion of the lung by organisms normally inhabiting the mouth. Mixed infection is also more common in infants and children than in adults. Interestingly, too, the type of onset appears to be much influenced by the pneumococcic type, since it is generally noted that cases due to Types 1 and 11 have the most explosive onset. It is well known, too, that streptococcic pneumonia is likely to occur in the course of or following epidemics of measles or "flu" and is often quite protean in its manifestations, frequently following a sore throat.

However, quite apart from these well-known variations in the commonly seen types of pulmonary infections, which are believed to comprise over 90% of all large hospital series, there is another, but much less well recognized group, lacking most of the common characteristics of the above groups in respect to onset, physical findings, clinical course and prognosis. In this group there is generally an absence of significant numbers of pneumococci, streptococci or other well recognized excitants in either sputum or blood stream.

It is not uncommon to see such pneumonias occurring as mild epidemics in private schools, barracks, military camps, etc., but more generally they occur as sporadic cases, when sought radiographically, and often they show but meagre signs and symptoms. Whether this group consists mainly of acute respiratory infections with secondary invasion of the lung by organisms of quite low virulence, or is essentially a primary bronchopneumonia of low virulence with a common-cold-like complex, is not yet settled and probably matters little from the point of view of management as long as one keeps in mind the well-established fact that considerable brochopneumonia can and does occur with a clinical picture which simulates the so-called "common cold" very closely.

Most of the studies reported over the past few years stress the many atypical clinical features of much of the pneumonia seen, especially in the diagnostic chest clinics. That a great percentage of such atypical pneumonias occur in childhood and young adults during the course of a mild upper respiratory infection has been pointed out by numerous workers, but we still believe that insufficient emphasis has been placed on this very common relationship.

Incidence.—Whether one sees many interesting problems will depend, of course, to a great extent upon the type of practice and the facility with which x-ray study of the chest can be carried out in the presence of apparently mild upper respiratory infections. But, most important of all, it depends primarily upon an awareness of the need for such examinations in the absence of clear-cut signs or symptoms of pulmonary disease. In other words, it has become increasingly obvious over very recent years that cases conforming to the classical description of pneumonia constitute but a small part of the total number of acute pulmonary infections and that much pulmonary infiltration, differing radically from lobar pneumonia in the absence of fulminating onset, pathogenesis, course or prognosis, is commonly encountered.

We wish to stress most strenuously that all available evidence indicates that such changes are not due to fundamental alterations in the host or in the virulence of the infection. The presently available data strongly suggest that the increase in incidence of such findings is due, not to new disease, but to more detailed and painstaking investigation of an old one; namely, of the oft neglected "common cold" syndrome often of quite mild clinical proportions. Many more persons now have x-ray study of the chest for such mild respiratory complaints, and thus the association of pulmonary infiltrations complicating these apparently minor respiratory episodes is increasingly noted.

We are strongly of the opinion that the profession generally is not yet sufficiently aware of the very considerable frequency with which bronchopneumonia occurs during the course of the so-called "common cold". In most cases, perhaps, this complication is not a matter of grave import since the majority of such pulmonary lesions resolve quickly without serious residual effects. However, not infrequently, incomplete anatomical cure leads to extremely serious chronic pulmonary sequelæ. Examples of such post-pneumonic injury crowd all outpatient chest clinics. During the past five years well over 80% of all new cases of primary pneumonia seen in our many outpatient clinics have been suffering from varying degrees of acute or chronic bronchopneumonia.

In the vast majority of these patients significant pulmonary symptoms shortly followed either the occurrence of a recognized pneumonia with protracted convalescence, or a rather prolonged so-called "chest cold" with a definite tendency towards subsequent exacerbation, not infrequently associated with measles or whoop-

ing cough. We firmly believe that the incidence of bronchiectasis, which is ever so much more prevalent than generally appreciated, will not be greatly reduced until much more attention is paid to the radiographic study of the chests of patients suffering from the common cold syndrome.

Signs and symptoms.—The onset of such pulmonary complications is quite varied. In one group parenchymal changes may be found radiographically some days following the onset of apparently quite mild respiratory attack, or they may be found in patients with "flu-like" onset with moderate fever from 102 to 103° over three to four days. In another group, such infiltration will be noted when the only previous history is that of a sore throat of two to three days' duration without symptoms, suggesting extension to the bronchial tree. In still another group will be found patients having only such vague complaints as lassitude, slight fever or anorexia. Many of these patients merely state they had a "chest cold" a couple of weeks ago, but that they continued their usual routine without any special treatment. Not infrequently, many such lesions are discovered quite by chance on routine examination, with nothing more significant in the history than the story of slight hacking cough perhaps only intermittently over the preceding week or two. Such cases have been called "silent pneumonia".

Physical signs.—Physical examination of such cases shows a wide variety of physical signs, depending upon size and location of the lesion. Frequently at the onset there is merely breath-sound suppression with no râles, followed in a day or two by a return of breath sounds with râles. At times coughing or deep respiratory effort lessens such findings very materially, with improved aeration. If the lesion is deep within the lung there may be no signs; whereas, when superficial, there frequently is restricted movement of the affected side in addition to the alteration in breath sounds and resonance. Probably the most common finding in the early stages is of slight impairment of resonance with slightly weak breath sounds and a few moist râles over some portion of the bases, either near the cardiac apex, but rather more frequently over the right base in the region of the cardiohepatic angle. If the pulmonary lesion is retrocardiac, very considerable difficulty may be experienced in its identification. In a few cases the breath sounds are totally absent; but bronchial breathing is quite uncommon.

In cases of so-called acute capillary bronchiolitis the clinical picture is frequently startling, since the patient, usually a young child, has intense and persistent paroxysmal productive cough, often with great dyspnœa and cyanosis associated with generalized pulmonary emphysema and more or less constant fine râles throughout the chest.

We are not unmindful of the fact that lobar pneumonia of the primary pneumococcal type may present unexpected and confusing pulmonary signs. Pneumonic consolidation when due to alveolar exudate usually shows considerable impairment of the percussion note and some degree of bronchial breathing. However, if bronchial obstruction complicates the condition one may find faint to absent breath sounds and much less change in percussion note. The degree of impairment of breath sounds depends upon the size and location of the bronchi occluded and the degree of such obstruction. Such blockages need not be persistent and, obviously, physical findings will be variable if there is intermittent bronchial blockage and patency.

Mechanism of production signs.—These pulmonary lesions are regarded mainly as an instance of lobular atelectasis with varying degrees of infection beyond the partial bronchial obstruction due to either œdema of the bronchial mucosa or to plugging by viscid secretion, or both, secondary to low grade bronchial infection. If bronchial patency is re-established early in the disease with adequate drainage, the infection subsides rapidly and this suppression of breath sounds will not be noted, nor will râles be heard. If, however, the inflammatory process descends to the finer bronchioles, the infection of the parenchyma occurs giving rise to persistent crepitations.

The atelectasis may be lobar, lobular or finely patchy in its distribution, depending upon the size and number of bronchi obstructed. The associated physical signs vary with the site and extent of bronchial involvement together with the rapidity and degree of obstruction as well as upon the virulence and extent of the parenchymal infection. It is not uncommon in the terminal phase for coalescence of multiple foci to provide a radiographic picture simulating even lobar pneumonia.

Viscid secretion is undoubtedly the commonest cause of such bronchial obstruction,

especially in children, and particularly in infants. This is to be expected from a consideration of the calibre of their bronchi. Patchy and often finely disseminated lesions in infants on such an obstructive basis have been described under such titles as peri-bronchiolar pneumonia and capillary bronchiolitis. In addition to this type occurring characteristically in very young children, all grades of infiltrative change are noted and such names are applied as: (1) unresolved pneumonia; (2) delayed resolution; (3) silent pneumonia; (4) chronic pneumonia; (5) interstitial pneumonia; (6) virus pneumonia; (7) pneumonitis, etc., depending upon stages of disease, location, distribution and extent of lesion noted radiographically. But we believe that clinicians will hesitate to accept these terms for a variety of reasons, namely:

Unresolved pneumonia is a term not particularly scientific, although it is much used. If the process is one in which resolution is unduly delayed, it should be classified as delayed resolution, and most of the investigations with serial x-rays, bronchoscopic examination and drainage indicate that these lesions associated with the common cold are not cases of true delayed resolution, if by that we mean that they are due to a variety of factors leading to faulty liquefaction or absorption of the alveolar exudate. Probably most cases labelled unresolved pneumonia are suffering primarily from some type of bronchial obstruction, complete or incomplete, rather than from a true delayed resolution. There is no fixed time limit after which pneumonia becomes unresolved. However, persistence of abnormal signs or radiographic abnormalities in the chest four weeks after the onset of symptoms indicates that the process is probably a true unresolved pneumonia or that some complication is present. True unresolved pneumonia is generally considered to be a definite entity, in which resolution is delayed several weeks or longer following the crisis, and occurs in about 2.0% of cases of classical pneumonia. In a few cases it is due to mixed infection; frequent sputum examinations are therefore indicated in such problems.

It is impossible from a single radiographic examination in most instances to distinguish with any degree of accuracy between a resolving pneumonia, a true unresolved pneumonia, pneumonia secondary to partial bronchial occlusion, and lung abscess. It is the rule that the differential diagnosis can be firmly established only by serial x-ray study over a considerable period or bronchoscopic examination of the bronchial tree when indicated.

Silent pneumonia (silent bronchopneumonia).—Although many pneumonias are silent in respect to abnormal physical signs and symptoms, we feel that the term silent pneumonia is not totally satisfactory, in that it conveys no impression whatever of pathogenesis. In addition, the clinician is unduly influenced in the choice of this term by the presence or absence of such findings as fever, languor, and abnormal physical features. In many cases the febrile phase is unrecognized by the patient and is terminated before the physician is consulted. He thus gains the impression that these pneumonias are *persistently* silent when he has thus been afforded an opportunity of seeing them only subsequent to the active febrile period in many instances. However, we believe that this term, keeping in mind its limitations, is perhaps the best of the lot in a clinical sense for the very mild ambulant group which is characterized by such a paucity of constitutional or abnormal physical findings of any sort, and for the *unsuspected* group discovered on routine examination.

Interstitial pneumonia.—The first objection to this term is that it is essentially a pathological one and cannot be made with any degree of accuracy from clinical or radiographic study, although it is a most satisfactory term for the pathological pictures seen at autopsy.

Virus pneumonia.—Rather numerous articles concerning virus pneumonia have appeared during the past three to four years, but most of these have dealt primarily with the clinical aspects of the disease and in only a few cases has a virus been isolated. However, it must not be forgotten that a number of workers have made very valuable contributions to the virus etiology of pneumonia. Horsfall, for example, demonstrated serial pneumonic lesions in the mongoose from naso-pharyngeal washings of infected patients. But, interestingly enough, the mongoose alone was susceptible to this virus, which appears to differentiate it from other pneumonotropic viruses such as meningo-pneumonitis, psittacosis or lymphocytic-chorio meningitis, or from the filterable virus isolated from two cases by Stokes, Kenny and Shaw which was pathogenic for ferrets and mice. Eaton, Beck and Pearson isolated a psittacosis-like virus from six cases which were acutely ill, one of whom died. This virus too was pathogenic

for mice. Smadel reported the occurrence of bronchopneumonia in two fatal cases of lymphocytic-chorio-meningitis. Adams, in studying a severe form of pneumonia in infants, found cytoplasmic inclusion bodies in the epithelial cells of lungs in fatal cases, but he was not successful in isolating a virus.

It is thus clear that sufficient experimental work has been done to justify the contention that a variety of viruses are at times causally related to the production of pneumonia, *e.g.*, the pneumonias caused by the viruses of influenza, chicken pox, lymphocytic-chorio-meningitis and mongoose-infecting virus, etc. Although psittacosis has usually been included in this group, it has been rejected by certain workers because it has microscopically visible particles which they contend distinguish it from a true filterable virus.

There appears to be widespread distribution of a psittacosis-like virus infection (ornithosis) among birds, pigeons and poultry, and occasionally human beings are infected, and the pneumonic disease erroneously labelled virus pneumonia results: while other agents not virus, such as Rickettsia of American Q fever and *Coccidioides immitis* may give rise to a similar pneumonic picture.

Thus, though a sound basis for virus pneumonia, often with atypical clinical features has been established, yet insufficient laboratory studies are at hand to warrant the position that virus is the *usual* causative factor in any appreciable percentage of the many bronchopneumonias noted in the course of the so-called common cold of relatively mild proportions.

That the virus plays some important rôle in the etiology of epidemic acute respiratory infections is not denied, but that it frequently invades lung parenchyma to induce much of the bizarre pneumonias noted so frequently in patients with but mild to moderate respiratory symptoms is far from proved. At the moment it seems more likely that such virus infection ordinarily progresses but a short way down the bronchial tree in most instances, with subsequent production of bronchial mucous membrane changes leading to partial bronchial obstruction if the lesser bronchi are involved.

There is much evidence to indicate that the commonly occurring members of the basal flora of the upper respiratory tract are ordinarily incapable of causing bronchial pneumonia in healthy young adults, but few if any studies are available which would deny that such patchy pneumonia can occur due to low-grade infection distal to partial bronchial obstruction. Thus, all conditions leading to œdema of the walls of the finer bronchi or to the production of exudate, purulent or viscid, would promote such obstruction and thus provide an anatomical basis for subsequent infection. Both the radiographic picture and the physical findings of partial breath sound suppression and slight impairment of resonance with little or no intrapulmonary moisture strongly suggests that an initial phase of partial bronchial obstruction is present in the development of the pulmonary lesion.

Our present feeling, therefore, is that such partial bronchial obstruction is the prime anatomical requisite for the production of most of such pneumonic problems regardless of the factors leading to the obstruction. However, the purpose of this paper is not an attempt to establish a virus or non-virus basis for the class of pneumonias under discussion. Our sole aim is to add further emphasis to the very important practical point namely: that much bronchopneumonia is demonstrated radiographically without the commonly expected physical findings of dullness and tubular breathing in patients displaying clinical evidence of but a mild respiratory infection.

Physicians must become acutely aware of the fact that a considerable degree of pneumonia may be present with but the slightest changes in resonance and quality of breath sounds. A very appreciable number of this group will go unrecognized on the basis of physical examination even in the hands of the long experienced. X-ray study of suspected cases, both initially and terminally, is imperative if our study of the case is to be complete.

Pneumonitis. — The term pneumonitis has much to recommend it if clinicians could agree as to its accurate use. However, if, as at present, we cannot find uniformity of opinion among clinicians who employ the term, it seems most unlikely that clinicians and radiologists can be expected to reach a common point of view. We believe that the term pneumonitis is a thoroughly satisfactory one. This, we feel, is true whether the process is lobar, patchy or miliary, and our one and only objection to the term is that it is used mainly to describe a pulmonary lesion which for some reason or other is considered atypical or unusual. After all, what is an atypical bronchopneumonia? It is true it

may lack a variety of expected features clinically or from physical examination. However, that would scarcely warrant the use of the term in a radiographic sense. It seems to me that the present tendency to utilize this term when describing varying degrees of bronchopneumonia with unexpected signs and symptoms is due mainly to the fact that such a syndrome has not been widely appreciated either in general practice or large general hospitals. The probable reason for this is mainly because the chief reservoir of such material being largely of a mild type clinically and of relatively short duration, does not seek hospitalization but is seen in considerable numbers in out-patient chest clinics and elsewhere when special effort is made to x-ray the chests of any large group of persons with symptoms of relatively mild acute respiratory infections.

We object, therefore, to the conception that the occurrence of a mild degree of bronchopneumonia under such circumstances is atypical. We do not contend that it is the usual or routine finding, but it occurs with sufficient frequency when sought radiographically that we should forgo for once and all the beliefs that it is atypical or in the least unusual.

We feel that the terms "peri-bronchiolar pneumonia" and "capillary bronchiolitis" have some definite merit, but again these tend to have distinctly pathological significance rather than a precise radiographic one. For this reason it seems likely that they will be reluctantly accepted by radiologists. In addition, this term includes but a small portion of the entire group of obstructive pneumonias, occurring as noted previously *mainly* in children under two years of age.

It would therefore appear that no highly satisfactory term is now available which accurately describes all such shadows in terms of location, distribution, size and extent, and simultaneously conveys any impression relative to their pathogenesis or to the clinical picture. For lack of a better term, the writer chooses to call them "obstructive" bronchopneumonias. We believe this is a very clumsy term and trust that it will shortly stimulate the coining of a more concise and suitable one combining the desired radiographic and pathological connotations to include all gradations and combinations of such presumably obstructive phenomena.

Quite possibly undue emphasis is being attached to "tagging" this entity. The all-important aspect of the problem is obviously not nomenclature. What really matters and is of vital importance, is that every practitioner should become acutely aware of the fact that bronchopneumonia commonly occurs in the course of the so-called common cold as well as in measles and whooping-cough. This is important not so much because these pulmonary lesions constitute an immediate emergency or even require very special therapy at the outset. The significant features to be grasped are: first, the attending physician must be in a frame of mind to suspect such a possibility even in the absence of the usual signs of pneumonia and, secondly, he must establish by every means possible that any such complication so discovered has completely cleared before he discharges his patient as being quite fit. Failure to provide this type of supervision may leave his patient with a serious pulmonary focus of infection. True, it may go on to complete resolution and usually does, but too often such a happy ending does not occur and thus a potential basis for subsequent pulmonary damage of such serious proportions as bronchiectasis, chronic suppuration, organized pneumonia, etc., is laid.

Our clinical follow-up studies of bronchiectasis in children over a ten-year period in our diagnostic chest clinics indicate beyond doubt that much bronchiectatic disease follows within a relatively short period the occurrence of either a clinically recognized or unrecognized pneumonic process associated very frequently with measles, whooping-cough or an apparently mild respiratory episode from which the patient experiences a rather protracted recovery.

We wish to emphasize most emphatically that it is not at all uncommon for even the most experienced examiner to find extremely little or even no clearly obvious abnormal features on examination of the chest of such patients with so-called common colds, and yet very appreciable bronchopneumonic infiltration will be present radiographically. Very often the only other significant finding is of an elevated red blood cell sedimentation rate. Dullness to percussion with blowing breathing is distinctly uncommon initially. When once such an infiltrative process is discovered, it must be followed by serial x-ray study, since its final resolution cannot be presumed upon clinical grounds alone. It is the rule, rather than the exception, that the radiographic findings persist well beyond the period of signs and symptoms.

X-RAY FINDINGS

In addition to the clinical aspects, we feel that a brief reference to some of the salient features of the serial radiographs in these so-called atypical pneumonias is timely. There is nothing highly diagnostic in respect to the x-ray picture, in which the lesions are quite variable in size, shape, location and density. Usually, they are fairly well localized, but poorly defined. Frequently there is merely an ill-defined haziness sometimes limited to the hilar region and fanning out toward the periphery. Occasionally there is infiltration of the mid-lung region, but it is noted much less frequently in the infraclavicular region. In most instances they are seen as patchy infiltrations over one or other basal region. It is not uncommon for such radiographic findings to be noted in 24 to 36 hours following the onset of a mild flu-like attack, whereas, râles, when present, usually appear not earlier than the fourth or fifth day. Our experience confirms generally that of clinical studies reported elsewhere, namely, that these pulmonary shadows are characteristically quite transitory and show well marked clearing in five to ten days. However, in a few cases they persist for weeks. A few typical films are shown herewith.

A close study of such chest films reveals that appreciable associated displacement of thoracic organs such as heart, mediastinum and diaphragm quite commonly occurs. The frequency of such displacements is closely related to size, density and location of such pulmonary infiltrations, being much more common when the pneumonic area is in the lower lung field.

Such displacements are highly important, not because they constitute an immediate clinical complication but because serial study of their transition reveals much presumptive evidence of the utmost value.

Ordinarily such organ displacement gradually disappears as the pneumonic area clears. Restitution becomes complete as a rule, with the total disappearance of the pulmonary shadow. If, however, the pneumonia persists, there is likewise a persistence of the displacement of the heart or diaphragm or both. When complete restoration of a previously noted displaced heart or diaphragm has occurred, only a small percentage of patients will show appreciable residual pneumonic shadows.

In not a few instances, however, patients are seen in whom serial radiographic study reveals only slight restoration of the thoracic organs associated with almost complete resolution of the pulmonary lesion. Interestingly enough, the majority of these patients when examined clinically, continue to show mild signs or symptoms of their pulmonary infection such as slight cough, low grade fever, languor, lassitude, localized crepitation, anorexia, elevated red blood sedimentation rate, etc. Many such cases are relieved of their residual signs and symptoms by bed treatment over a period of three or four weeks with expectorants, local heat, etc., whereas, another small group achieves complete anatomical restoration only after bronchoscopic drainage of the material maintaining persistent bronchial blockage. In our clinics we have so frequently observed such a sequence of events that we now regard all such displacements of the heart or diaphragm or both, in the absence of significant evidence to the contrary, as presumptive evidence of previous pneumonic injury with resultant incomplete anatomical cure.

Dr. P. M. Andrus, chief of our Radiological Service, has recently had a unique opportunity of studying this problem in a large number of recruits admitted to the Canadian Army over the past two years. His report, covering a study of approximately 200 cases of "atypical" pneumonia occurring mainly in ambulant patients, has recently been published.

There is abundant evidence indicating that these so-called "atypical" pneumonias, with all their protean manifestations, are extremely common in acute and sub-acute upper respiratory tract infections; and it is equally clear that they are frequently due to some degree of bronchial or bronchiolar obstruction. If the patency of the bronchi is shortly restored, the pneumonia clears rapidly with complete return of pulmonary function, leaving no sequelæ; but if, on the other hand, the obstruction persists and adequate drainage cannot be effected, the pulmonary infection then progresses and varying degrees of parenchymal destruction result. It is most urgent to appreciate that adequate drainage must be attained before the obstruction and its associated infection has persisted for too long a time, otherwise irreparable damage is done both to the parenchyma and the bronchi, leading to progressive bronchial occlusion, bronchiectasis, abscess, organized bronchopneumonia or any combination of these.

All such protracted cases demand supervision

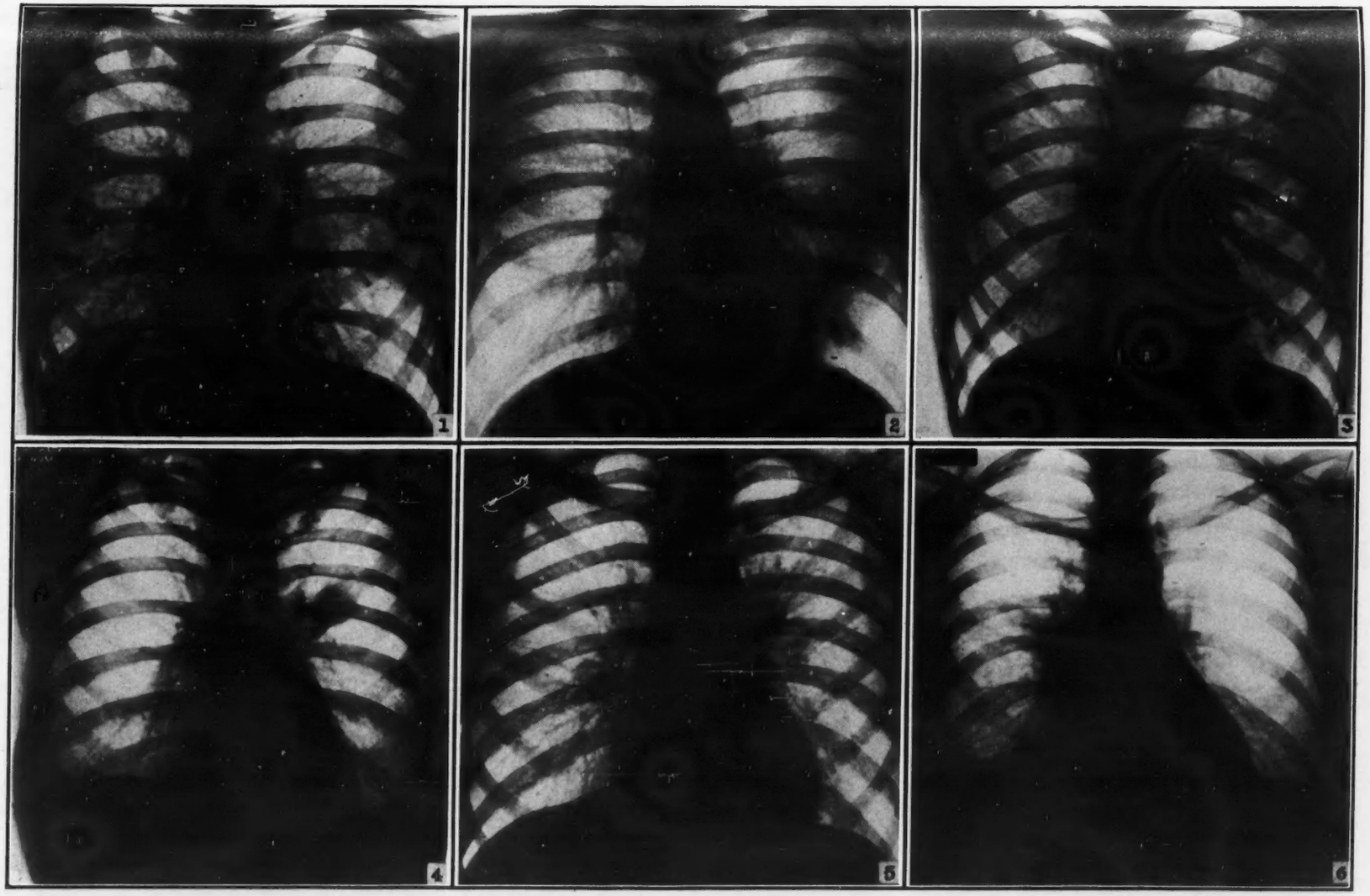

Fig. 1. E.G. (9740).—Routine chest examination, because of sore throat, fatigue, sternal tightness and slightly productive cough for two days, revealed no obvious abnormalities apart from right-sided lag. Patient was essentially symptom-free in nine days. Radiograph completely clear in fifteen days.

Fig. 2. G.C. (12655).—Sore throat, slight hacking cough, mild retrosternal soreness and temperature of 100° for two days, slight impairment of resonance over the left mid lung region associated with some lag on the same side, but no intra-pulmonary moisture. Sedimentation rate dropped from 68 to 17 mm. in one hour in thirteen days. Essentially free of symptoms in ten days. Radiograph clear in twelve days.

Fig. 3. F.B. (12647).—Mild "chest cold" for ten days with very slight fever. No physical abnormalities apart from questionable impairment of resonance over the upper left chest anteriorly associated with some lag of the same region. Radiograph cleared in eighteen days.

Fig. 4. Mrs. E.A. (Hospital Maid).—Mild hacking cough, languor and temperature 99.4 to 100° for two days; no abnormal physical findings. Sedimentation rate was 34 mm. in one hour but receded to 5 mm. in one hour over the next fifteen days. Radiograph clear in eight days.

Fig. 5. C.N. (17801).—Routine chest examination revealed numerous crepitations over both upper chests posteriorly near the spine, but more marked on the left associated with a few coarse rhonchi. Anteriorly, a few fine crepitations were heard medially in the second and third interspaces. No impairment of resonance, but slight lag noticed over the left upper chest. No fever at time of examination. Three weeks later no abnormalities of the pulmonary fields noted and radiograph was clear.

Fig. 6. Mrs. N.C.D. (6919).—Fatigue for one week, with slight ache over the medial aspect of the right lower anterior chest and hacking cough together with chilly sensations, nausea and declining appetite. No physical abnormalities apart from restricted movement over right base posteriorly. Temperature was 99 to 100° at this period and sedimentation rate was 32 mm. in one hour. A small right-sided effusion was noted one week following the discovery of the bronchopneumonia shown above. Complete resolution of pneumonia and effusion occurred in 25 days.

and painstaking investigation of the bronchial tree to discover, if possible, any complicating factors interfering with the return of the pre-pneumonia status.

Children with head colds, sore throats and so-called mild chest colds should be kept indoors at the outset of such infections and in bed for much of that time, if possible, whether or not fever is present. By so doing one reduces the chance of spread of infection to others and materially lessens the incidence of complications. The common cold and so-called minor childhood infections of measles and whooping-cough with their associated bronchitis impose upon children a potential danger of staggering proportions in respect to subsequent chronic pulmonary infection and depletion of pulmonary function.

SUMMARY

1. Lobular atelectasis, partial or complete, occurring in the course of an acute respiratory infection is much more common than is generally supposed. Radiographically, it generally simulates bronchopneumonia. Clinical as well as laboratory studies of these problems strongly indicate that some degree of infection is frequently present distal to bronchial obstruction. The clinical course, usually benign and quite brief, is apparently determined by such factors as size, location and number of bronchi involved, the degree of blockage together with dosage and the virulence of infection distal to the bronchial occlusion.

2. The possibility of lobular atelectasis with some degree of infection complicating any acute respiratory episode, particularly if there is associated bronchitis, must be kept in mind, especially if the patient is a child and, more particularly, an infant.

3. Bronchopneumonia, seen under such circumstances, is frequently noted without the commonly expected findings of localized crepitations, tubular breathing and dullness to percussion. Abnormal pulmonary findings, when present, are usually found rather late in the attack, and are characteristically less obvious than would be expected from examination of the chest films. Even slight differences in breath sounds and resonance noted on physical examination of the pulmonary fields, especially at the bases, in a patient suffering from a respiratory infection, warrant a suspicion of a pulmonary complication. In most instances x-ray study alone will afford adequate information for a final opinion. Too much emphasis must not be placed on the lack of the commonly expected physical findings of pneumonia. If one has reasons to suspect the presence of pneumonia, he must not demand the presence of bronchial breathing, considerable impairment of resonance and crepitations. Examiners must become keenly aware of the fact that much bronchopneumonia occurs without such well marked signs. For the detection of such pulmonary lesions radiographic study of the chest is absolutely indispensable in a very considerable percentage of cases, depending upon size, location and duration of the lesion.

4. Very considerable variation in the onset and clinical course of such respiratory episodes is noted, ranging in extent from a picture simulating severe "flu" or grippe or a heavy chest "cold" on one hand to a complete ambulant status presenting practically no signs and only extremely mild symptoms on the other and, of course, all the intervening gradations are noted at one time or another.

5. All pneumonia patients should have a terminal x-ray study of the chest.

Numerous reports concerning the "flu"-like group have been reported over the past six or seven years, whereas, very meagre reports of the quite important ambulant group have appeared.

Rather considerable experience with such respiratory problems, particularly in children, strongly inclines us to discard the term "atypical" bronchopneumonia as a label for such cases, since we have observed over a period of years that such a sequence of events is relatively common, and should therefore not be regarded as in the least unusual or abnormal.

6. No studies reported to date have established a clear-cut virus etiology for this class of bronchopneumonia. We thus feel that until satisfactory laboratory studies to the contrary are completed, such pulmonary infections are best explained on a basis of partial bronchial obstruction with distal infection.

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RÉSUMÉ

Il arrive souvent que les infections pulmonaires aigues se compliquent d'atélectasie lobulaire. Nous avons la preuve de foyers infectieux situés assez loin de l'obstruction bronchique, surtout lorsque plusieurs bronches sont obstruées. Cette éventualité doit toujours être présente à l'esprit s'il s'agit d'un enfant ou d'un nourrisson. Une bronchopneumonie atypique est fréquente, surtout aux bases, et il faudra recourir à la radiographie pour établir le diagnostic tant les signes cliniques sont imprécis. L'évolution clinique de telles pneumopathies est très capricieuse: on observe tantôt les aspects grippaux, tantôt les signes excessivement légers d'états ambulatoires. L'étiquette bronchopneumonie *atypique* n'est pas satisfaisante; il s'agit d'examiner soigneusement le malade et d'établir un diagnostic de maladie *typique*, toujours possible avec l'adjuvant radiologique. Il n'existe pas encore de virus reconnu de ces bizarres bronchopneumonies. Jusqu'à plus ample information, ces infections pulmonaires doivent être interprétées comme des foyers infectieux à distance à point de départ d'obstruction bronchique partielle.

JEAN SAUCIER

PRIMARY ATYPICAL PNEUMONIA OF UNKNOWN ETIOLOGY

By S./Ldr. J. F. Meakins, M.A., M.D., R.C.A.F.

(In its original form this paper contained extensive introductory comments on the present views and work on the subject. They have been omitted however, in view of their having been fully presented in Dr. Becker's paper immediately preceding.—EDITOR.)

FROM June 15, 1942, to November 15, 1942, there have been admitted to this R.C.A.F. Hospital (the Technical Training School, St. Thomas, Ont.) approximately 150 cases with the eventual diagnosis of lobar pneumonia, pneumonia, bronchopneumonia and pneumonitis. It is safe to say that the great majority of these "pneumonias" were what could be termed "primary atypical pneumonia, etiology unknown". The exact number of such cases, unfortunately, cannot be ascertained, because many of the men have passed from this training station and their records left our hands before analysis could be made. However, more than a hundred on whom the records have been kept, have been in hospital with this syndrome. An analysis is presented of the data on 100 cases in an attempt to help to crystallize our views on this disease as an easily recognizable entity.

From the Table it will be seen that the onset is insidious (94%), the illness and course of disease mild (81%). The patients were far less ill or toxic than would be expected from their complaints, physical and x-ray findings, or fever. Only 10% of patients manifested any toxicity during the course of the illness; these will be mentioned later. The most prominent complaints were cough (usually dry and hacking; only 13% mentioned any sputum on admission), malaise, headache, chilliness, and head or chest cold (or both) prior to reporting sick. Thirty per cent of patients complained of pain, distress or some constriction in the chest; two-thirds of these had retromanubrial or retrosternal soreness; none had true pleuritic pain.

There is little to be said regarding the temperature reaction, the vast majority being in the zone of 100 to 103°, the high temperature of the first and second day in hospital; 69% were running a normal temperature in seven days or less and 89% within ten days or less. Of the remaining 11 cases one had low grade temperature for 21 days and another for 24 days. Neither of these two patients showed unusual symptoms or signs other than delayed

TABLE I.

Onset

Sudden	6%	Insidious	94%

Course of illness

Mild	81%	(25 cases treated with sulfonamides)
Moderate	15%	(6 cases treated with sulfonamides)
Severe	4%	(1 cases treated with sulfonamides)
Toxic manifestations	10%	
Non-toxic	90%	

Symptoms

Cough	81%	Sore throat	15%
Malaise	61%	Sputum on admission	13%
Headache	46%	Fatigue	13%
Chilliness	46%	Gastrointestinal distress	8%
Fever	27%	Dizziness	8%
Anorexia	25%	Dyspnœa or cyanosis	4%
Generalized aches	20%	Photophobia	4%
Retrosternal or substernal pain	20%	Head or chest cold	40%
Other chest pain	10%		

Signs

Inflammation of nose	16%
Inflammation of throat	31%
Râles on admission	47%
Changed B.S. on admission	49%

Chest signs appeared in 28% of cases 1 to 9 days after admission.

Temperature

1st day— 99°	6%	1st day—102°	26%
" " 100°	19%	" " 103°	22%
" " 101°	18%	" " 104°	9%

To normal in 10 days or less	89%
To normal in over 10 days	11%
Fell by lysis	98%
Fell by crisis	2%

In these two cases temperature only 1 day's duration.

Leucocyte count

Below 10,000/c.mm.	73%
10,000/c.mm. to 15,000/c.mm.	26%
Above 15,000/c.mm.	1%

X-ray findings in lungs grouped according to approximate lung areas

Right upper lung zone	8%
Right middle lung zone	9%
Right lower lung zone	50%
Left upper lung zone	11%
Left middle lung zone	4%
Left lower lung zone	44%
Involvement of more than half a lung field *in toto*	26%

Duration of physical signs

No signs manifested	4%	16 to 20 days	18%
5 days or less	5%	21 to 25 days	13%
6 to 10 days	14%	26 days or more	21%
11 to 15 days	25%		

Average duration of physical signs was 18.1 days.

Days spent in hospital

15 days	9%	26 to 30 days	13%
16 to 20 days	20%	31 to 35 days	17%
21 to 25 days	23%	36 days or more	18%

The average stay in hospital was 27.24 days.

resolution; however, peculiarly enough, both were treated early in the disease with sulfapyridine (630 grains in seven days). In 98% of instances the temperature fell to normal by lysis; in the remaining 2 the temperature was up on the first day and normal thereafter. A very pertinent fact is that the pulse rate is disproportionately low in all cases considering what would be expected from the febrile state. The pulse varied between 70 and 100 per minute, really a relative bradycardia. Respirations were rarely over thirty per minute, and never embarrassed.

The leucocyte count was below 10,000/c.mm. in 73% of cases, with an insignificant change from normal of the differential count. Of the 26% that had counts between 10,000 and 15,000/c.mm. the majority lay in the 10,000 to 13,000/c.mm. zone. A leucopenia was noted initially many times. The cases that ran a protracted and severe course would show a rise of the leucocyte count later in the disease, but this was not always the case and the count was rarely over 15,000/c.mm. Sputum and throat cultures failed to reveal any pneumococci, hæmolytic streptococci, or Friedländer's bacilli; the predominating organism being *S. viridans*. The blood sedimentation rate results were inconsistent and of no particular help. Sixty-two per cent of cases examined had a blood sedimentation rate that was normal or subnormal, the remaining 38 per cent being variably raised.

The physical signs in the chest in many cases were indefinite and insignificant early in the disease, especially when compared with the changes present by x-ray in the same case at the same time. Changed or relatively suppressed breath sounds in patchy distribution, with later developing râles, were the usual findings. Percussion note changes were often not demonstrable even when signs of considerable disease could be heard on auscultation. In several cases an uneven and patchy area with signs of consolidation would develop, which might become lobar as the disease spread. Physical signs in the chest did not develop until one to nine days after admission in 28% of patients.

During the latter part of the course of the disease a resolution phase set in, with improvement of aeration in the affected portion of the lung fields, and many coarse râles would appear; the cough would be productive at this stage of a sputum slightly yellow-tinged but mainly mucous. It was found that physical signs in the chest would last considerably longer than the febrile state or than the patient felt unwell. In very many cases the patients felt so well that they could not understand why they were kept in hospital, far less in bed. It should be noted here that the physical signs lasted longer in the 19% of cases that were moderately or severely ill, and convalescence in these cases was also longer. The average duration of signs for all cases was 18.1 days. The average duration of signs was 15.6 days when the twelve cases which had delayed resolution were not counted. For these twelve the average was 33.66 days.

The x-ray changes were mainly of a patchy and hazy type of infiltration with poorly defined edge and shading into normal lung. This seemed to spread in a fan-shaped manner from the hilar area peripherally and in the majority of instances to the lower lung zone (Table I). An increase in hilar shadows and bronchial-tree

markings frequently were seen preceding more advanced stages and invariably existed after the main x-ray changes in the parenchyma had cleared away. A few cases of isolated peripheral shadows only were found. In several instances in which the upper lung zone was involved the shadow had the appearance of a tuberculous infiltration, and might have been called such if it had not cleared completely and rapidly. Involvement of the upper lung zones showed more rapid clearing than involvement of the lower lung zones. Certain of the shadows of the lower lung zones became so dense that fluid was suspected, even when physical signs did not support it. In two such cases, which are in the hospital at the moment and not included in this series, fluid was suspected so strongly that chest taps were done, without success. Sometimes, but seldom, the x-ray changes appeared about a week after admission, and after physical signs were well established. Physical signs would often linger on after the chest x-ray was clear except for increased bronchial tree markings; of course, the reverse was more frequently true. Many of the cases would have been called bronchitis if x-rays had not been available, and frequent careful physical examinations done.

The cases can be divided into 81% mild, 15% moderate and 4% severe. All the severely ill patients showed some signs of toxicity, such as temporarily elevated pulse rate, increased respiratory rate, moderate cyanosis (only one patient required oxygen), very severe headache, some photophobia with the headache, and lethargy. No real neck rigidity was encountered. All but one of the severely ill patients had a migratory spread of the pulmonary disease. Severe headache was common in the moderately ill and severely ill, and often was accompanied by the patient being lethargic and drowsy. The combined picture suggested a mild encephalitic state; in two patients, lumbar puncture was done with negative results. In all but the mild patients diaphoresis was present daily in the early stages of the disease, and would continue sporadically in the severely ill well into convalescence.

Treatment was symptomatic in 68%; the remaining 32% were given a sulfonamide (in most cases sulfapyridine) in addition with no improvement or change in the usual course of the disease. This agrees with the findings in the literature. Symptomatic treatment and good nursing care gave the best results. When signs of resolution appeared, or in early convalescence, it was found that a stimulant cough mixture, deep breathing exercises, and, in obstinate cases, postural drainage, helped the clearing of the lung fields.

The average hospital stay was 27.24 days (average of all cases), however, with the 12% with delayed resolution not counted the average for the remaining 88% was 24.7 days. The average hospital stay of the patients with delayed resolution was 47.75 days. Most cases were given 7 days' convalescent sick leave, followed by two weeks of light duty. The severely ill patients and certain of the moderately ill patients were given longer periods of convalescent leave. An interesting fact is that these patients who have suffered from this usually mild disease become fatigued easily for a long time following recovery from the actual disease.

The following complications were noted during the course of the disease or in convalescence; acute catarrhal otitis media, 6%; delayed resolution with eventual clearing of the chest, 12%; atelectasis with early bronchiectatic changes, 1%.

From study of the distribution of the cases in the living quarters of the station there was little evidence of clumping of cases but rather they came from all parts. It was felt that isolation of living quarter contacts would be useless as the men are thoroughly mixed at work and meal times and contact with developing or early cases might be anywhere. What evidence that could be acquired indicated an incubation period of 10 to 18 days. The age-grouping of the patients corresponded with the general age-grouping of the station.

A more careful study, and grouping into types, of the roentgenological findings of these 100 cases is to be made. At present, through the kind co-operation of Dr. Ronald Hare, of the Connaught Laboratories, an attempt is being made to isolate an etiological agent from the pharyngeal washings of four patients. Blood early in the disease and in convalescence has been taken for complement fixation and cross neutralization tests. In the face of completely negative bacteriological findings on these patients it has been assumed that a virus or virus-like agent is the etiological factor.

The following two case histories are presented as representative of the moderately severely ill

cases. The severely ill patients show an accentuation of the same general picture.

CASE 1

R.E.P., aged 21, was admitted to hospital on October 9, 1942, complaining of slight head cold for one week with a dry rough cough, anorexia and malaise for two days. On day of admission he had headache, some dizziness, slight chilliness followed by a feeling of feverishness on arising. He fainted on parade that morning. Remainder of history unremarkable. Temperature 102° F., pulse 100, respirations 24. Admission examination revealed a well developed man. Nose and pharynx were injected. Skin was clear. Heart not enlarged, but there was a soft systolic murmur at the apex. Chest: expansion good and equal, percussion note resonant throughout, tactile fremitus and voice sounds normal, breath sounds were slightly suppressed over the right lower lung zone and a few fine dry râles were heard at both bases. Remainder of the examination was negative.

Laboratory data.—Urine normal; white blood cells 13,000/c.mm., polymorphonuclears 80%, monocytes 8%, lymphocytes 12%, blood sedimentation rate 19 mm. in 1st hour. X-ray chest: patchy bronchopneumonic infiltration from hilar region towards both bases; throat and sputum cultures: no pneumococci, hæmolytic streptococci or Friedländer's bacilli; *S. viridans* predominating.

October 10, the temperature was 104° F. in the a.m. but fell to between 100 and 101 F.° for the remainder of the day; the pulse was 76 to 90 and respirations 20 to 30 per minute. Patient complained of headache and profuse diaphoresis without any preceding chills. There were no respiratory complaints other than dry cough, no dyspnœa or cyanosis. Breath sounds, moderately suppressed without change in character at right base. No râles on this examination. White blood cells 13,500/c.mm.

October 11, the temperature was 100.2° F. in a.m., rose twice to 104° F. without any chill, but followed each time by profuse diaphoresis. Pulse 90 to 100 per minute, respirations 24 to 30. He complained of headache, feeling of stiffness of neck, sore eyes, and feverishness. Appeared quite sick and flushed without dyspnœa or cyanosis. Throat was congested, tongue coated, no stiffness of neck, reflexes normal. Lungs: slight suppression of breath sounds at both bases (right more than left) with a few medium râles. Blood culture taken, was negative after five days. Chest x-ray: no change (if any a slight increase) in the infiltration noted before. White blood cells 12,000/c.mm.

October 12, slight improvement in well being. Temperature 100° F., pulse 80, respirations 24. No change in physical findings of chest. Throat improved.

October 13, throat clear. Improvement in aeration of chest, râles fewer, temperature, pulse and respirations within normal limits and remained so.

October 16, chest clear to physical examination. Feeling very well. Chest x-ray; infiltration clearing rapidly from lower lung fields, hilar shadows and bronchial tree markings slightly increased.

October 19, chest clear, systolic murmur disappeared. Started up. From here on convalescence was unremarkable. After eighteen days in hospital the patient was discharged and given ten days' sick leave followed by fourteen days' light duty. A moderate and easy fatigue lasted for about six weeks.

CASE 2

H.G.J., aged 21, was admitted to hospital on November 11, 1942, because of headache, anorexia and dry cough for two days, malaise and dizziness on day of admission. Admission physical findings were coated tongue, injected pharynx, normal heart and the chest was clear. Temperature 101° F., pulse 80, respirations 22.

Laboratory data.—Urine normal; white blood cells 8,600/c.mm. differential count not unusual, blood sedimentation rate 5 mm. in 1st hour. Throat and sputum cultures: *S. viridans* predominating.

November 12, temperature 103° F. in a.m. but fell to 100.4 to 101° F. during rest of the day. Pulse 70 to 86, respirations 24 to 28. No change in condition or in physical findings. Chest x-ray: considerable bilateral broncho-pneumonic infiltration, most marked in the lower left lung field, spreading from the hilar regions.

November 13, temperature up again to 103° F. in a.m. and fell later in day to 101° F.; pulse and respirations as before. General condition good, no physical signs of disease in the chest. Diaphoresis frequent.

November 14, temperature ranged from 102 to 103.6° F., pulse 80 to 90 and respirations 24 to 28. Patient complains of frequent diaphoresis; headache in mornings when he feels his worst. Examination of the chest revealed bronchovesicular breath sounds in the left lower lung field posteriorly, no other findings. Throat clear.

November 15, from this day until November 21, the patient had a daily a.m. temperature of 102 to 103° F., falling by afternoon to below 99° F. The pulse remained between 70 and 100 per minute with the respirations never over 28 and mainly below 24 per minute. On November 22, the temperature was 101° F. in a.m. falling to normal and remaining normal thereafter. Pulse and respirations were normal. The patient would feel poorly in tne early mornings, but would recover well being during the late morning and feel fine for the rest of the day, except for occasional headache and frequent diaphoresis. Cough was annoying. Mixed areas of bronchovesicular and bronchial breath sounds with almost tubular voice sounds developed in the left chest from the angle of the scapula to the base. A few medium and fine râles were present. Right lung normal. No sputum. On November 18, a few more râles were heard and a small amount of sputum was brought up. On November 23 coarse resolution râles started to appear in the upper portion of the involved area of the left lung. Breath sounds losing bronchial character. Examination on November 25 revealed resolution râles, medium and coarse, throughout the entire previously affected area of the left lung, sputum increased. Aeration improving. Started on deep breathing exercises. Postural drainage was started on November 29 with an increase in expectoration.

Chest x-ray (November 16).—Pulmonary infiltration has spread, with involvement of entire left lower lung field to third anterior interspace. In the right chest there is a basal lesion close to the cardiophrenic angle and another area in the right upper lung field laterally, both areas are connected by infiltration to and from the hilus. November 23. Further marked spread of the parenchymal infiltration in both lungs. Left lung disease reaches into first anterior interspace but is patchy in upper area. The right lung disease is thinner and patchier but almost as extensive. Apices and costophrenic angles are clear. November 27. Extensive resolution of the parenchymal lesions in both chests has occurred in past five days. Heavy residual lung markings in lower half left lung field and less marked in right. December 7. Chest clear but increased bronchial tree markings. White blood cells, November 18: 8,800/c.mm.; November 25, 8,100/c.mm.; December, 7,300/c.mm. Postural drainage and deep breathing exercises have helped increase sputum output and improve aeration of lung fields. This patient is still in hospital and doing very well with the left chest almost clear of râles.

This case is not included in the series of a hundred, but it is felt to be an excellent example and is quoted as such. It is interesting to note that at no time were there abnormal findings in the right chest.

SUMMARY

1. The literature on "primary atypical pneumonia, etiology unknown" is briefly reviewed.

2. An analysis has been presented, based on 100 cases, of a disease entity that might easily be mistaken for severe coryza, "grippe", or bronchitis, but which has always shown in time infiltrative changes by x-ray in the lungs, and in 96% of cases physical signs. Cough was the main complaint. Usually a normal leucocyte count was found. The course of the disease was mild. No dangerously ill patients have been seen yet and there have been no deaths at this hospital.

3. Two case histories are given as representative of the moderately ill patients.

4. Because of the variety of findings on physical and roentgenological examination, and the uncertainty of the etiology in all cases, it is suggested that the name "primary atypical pneumonia, etiology unknown" should be adopted for cases of this type.

(For Bibliography see preceding paper.)

RÉSUMÉ

La pneumonie primitive atypique d'étiologie inconnue a un début insidieux et évolue de façon bénigne. Cent malades ont été suivis en vue de cette communication. Le signe dominant est la toux. 30% des malades ont eu des douleurs thoraciques. La température oscille entre 100 et 103 degrés pendant 2 ou 3 jours. Le pouls est lent et est en désaccord avec la température. La respiration dépasse rarement 30 à la minute. La leucocytose est habituellement en deça de 10,000 par m.m.c. Les crachats révèlent surtout le *S. viridans*. Les signes pulmonaires, insignifiants, ne correspondent pas aux condensations vues aux rayons X. La durée moyenne de ces signes est de 18.1 jours. Aucun décès ne fut enregistré. Le traitement a été symptômatique chez 68%; 32% ont reçu les sulfamidés. La moyenne de jours d'hospitalisation fut de 27.24. JEAN SAUCIER

SEASONAL VARIATIONS IN THE WATER-CONTENT OF THE RESPIRATORY TRACT OF MAN AND OTHER MAMMALS*

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A NUMBER of years ago a fortuitous observation made in this laboratory led to the revelation that the water-content of the respiratory tract of albino rats varied with season. It happened that the water-content of various sections of the respiratory tract of white rats was being measured as a method of studying expectorant action and the results of this study were reported in this *Journal*.[1] The water-content of the respiratory tract of other albino rats being used as controls was found, after a year's study, to vary with season, the lungs, and especially the trachea, drying appreciably in the winter months of the year.[2] In a subsequent investigation,[3] a similar drying of the respiratory tract was noted to occur in pigeons and cockerels as well as in rats in mid winter. These results suggested that a systematic study of several species of mammals, including man, was indicated. The present communication is an account of such an investigation.

In the present report it will be shown that there occurs at some period during the winter months a drying of some or all parts of the respiratory tract of mice, rats, cats, rabbits, guinea-pigs and man. These observations, coupled with those of previous communications, leave little doubt that this is a general phenomenon, at least of this climate and geographical location. The results indicate that during the winter months there occurs a change in the functional activity of the respiratory tract and this change may be related in some manner to the seasonal variation in the incidence of disease of the respiratory tract. In most textbooks, discussion of the etiology of respiratory tract infections is limited almost entirely to the infecting organism. The data presented in this communication indicate that the host should also be considered in any such discussion.

The technique followed in the present investigation was identical with that already described.[2] In brief, the respiratory tract was quickly dissected out after killing the animals and it was then divided into three parts: (*a*) the trachea; (*b*) the peripheral third or half of the pulmonary lobes which was referred to as the alveolar portion of the lung, and (*c*) the remaining centripetal part of the lung which was termed the bronchial portion. In the case of human lungs, a piece of tissue weighing 1 to 2 grm. was removed from the lower trachea, from the root of the lung and from the periphery of the lung, *i.e.*, from regions corresponding to those examined in the animals. Specimens of the respiratory tract of man were obtained from autopsy material through the courtesy of Dr. James Miller, Professor of Pathology. The water-content of these various

* This report represents the completed description of a problem presented in preliminary form before the Annual Meeting of the Canadian Medical Association, Winnipeg, June, 1941.

portions was then determined as already described.[2]

The general plan of the work was to examine approximately 10 animals of each species at approximately monthly intervals over a period of 1 year. The actual numbers of animals studied are given in subsequent tables. Only eleven human respiratory tracts were examined, too few for a sound basis of conclusions, but the results in man were essentially similar to those in the lower mammals.

RESULTS

The percentages of water (grams water per 100 grams fresh weight of tissue) in each portion of the respiratory tract of each species were tabled at each month they were determined and the mean values were calculated. After a period of one year these means were plotted. The graphs obtained indicated, almost without exception, that at some time during the winter months there occurred in each species a drying of the respiratory tract. As an example, there is shown in Fig. 1 the percentage of water in the tissues of the trachea of the cat at progressive seasons of the year. It may be seen that during November, December, and January the trachea was distinctly more dry than during the other months of the year. The mean water-content during November, December, and January was 68.5% of the fresh weight of the trachea of cats and the mean had a standard error of 0.50 (standard deviation divided by the square root of the number of readings). By contrast, the mean water-content of the trachea of cats in the remaining months of the year, which may be designated from February to October inclusive, was 72.3%, with a standard error of 0.50. The mean difference in the water-content between these two seasons was then found and divided by the standard deviation of the mean difference (the square root of the sum of the squared standard errors) and the resulting quotient of significance was 5.4. If this latter quotient is 2, the probabilities are 19 out of 20 that the difference is not due purely to chance and if the quotient is 3, the chances are 99 out of 100.[4] A value of 2 or more for the quotient is usually taken as indicative of a statistically significant difference.

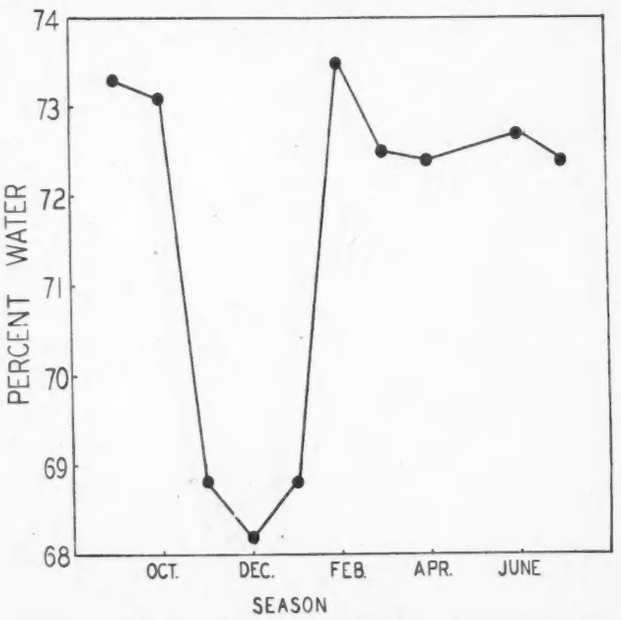

Fig. 1.—Seasonal variation in the water-content of the trachea of cats.

To obviate the necessity of presenting all of the data in graphic form, an expensive method of presentation, the plan followed with all of the remaining graphs was to calculate the mean water-content during the drying season, as indicated by the graph, and during the moistening season which was the remainder of the year, and then to calculate the statistical significance of the difference between these two

TABLE I.

A COMPARISON OF THE WATER-CONTENT OF THE TRACHEA OF MAMMALS IN THE WINTER MONTHS (DRYING SEASON) WITH THE SUMMER MONTHS (MOISTENING SEASON)

Species	*Number of animals*	*Drying season*		*Moistening season*		*Mean difference*
		Months	*Per cent water*	*Months*	*Per cent water*	*Standard deviation of mean difference*
			Mean ± St. error		*Mean ± St. error*	
Albino rat	105	Nov. to Feb.	67.5 ± 0.42	Mar. to Oct.	75.0 ± 0.17	16.0
Guinea pig	115	Oct. to Jan.	64.3 ± 0.78	Feb. to Sept.	69.2 ± 0.61	4.9
Rabbit	146	Jan. to Feb.	63.4 ± 1.7	Mar. to Dec.	74.2 ± 0.67	6.0
Cat	90	Nov. to Jan.	68.5 ± 0.50	Feb. to Oct.	72.3 ± 0.50	5.4
Man*	11	Jan. to Feb.	74.2 ± 0.75	Mar. to Jul.	79.5 ± 2.8	1.9

*No observations were obtained on human specimens from August to January.

TABLE II.

A COMPARISON OF THE WATER-CONTENT OF THE ALVEOLAR PORTION OF THE LUNG OF MAMMALS IN THE WINTER MONTHS (DRYING SEASON) WITH THE SUMMER MONTHS (MOISTENING SEASON)

Species	*Number of animals*	*Drying season*		*Moistening season*		*Mean difference*
		Months	*Per cent water*	*Months*	*Per cent water*	*Standard deviation of mean difference*
			Mean ± St. error		*Mean ± St. error*	
Albino rat...	105	Nov. to Feb.	78.8 ± 0.20	Mar. to Oct.	80.8 ± 0.23	6.7
Guinea pig..	115	Oct. to Jan.	79.6 ± 0.35	Feb. to Sept.	80.7 ± 0.18	2.8
Rabbit.....	146	Nov. to Mar.	79.0 ± 0.39	Apr. to Oct.	80.8 ± 0.34	3.5
Cat*.....	90					
Man**.....	11	January	79.4 ± 0.35	Feb. to Jul.	82.7 ± 0.80	4.3

*No significant seasonal variations in the water-content of the alveolar portion of the lung of cats were observed.
**No observations were obtained upon human specimens from August to January.

TABLE III.

A COMPARISON OF THE WATER-CONTENT OF THE BRONCHIAL PORTION OF THE LUNG OF MAMMALS IN THE WINTER MONTHS (DRYING SEASON) WITH THE SUMMER MONTHS (MOISTENING SEASON)

Species	*Number of animals*	*Drying season*		*Moistening season*		*Mean difference*
		Months	*Per cent water*	*Months*	*Per cent water*	*Standard deviation of mean difference*
			Mean ± St. error		*Mean ± St. error*	
Albino rat...	105	Nov. to Feb.	78.1 ± 0.16	Mar. to Oct.	79.7 ± 0.26	5.0
Guinea pig..	115	Jan. to Feb.	77.9 ± 0.56	Mar. to Dec.	79.2 ± 0.19	2.2
Rabbit.....	146	Dec. to Jan.	75.7 ± 1.1	Feb. to Nov.	79.4 ± 0.25	3.4
Cat*.....	90					
Man**.....	11	January	72.4 ± 1.1	Feb. to Jul.	77.1 ± 1.6	2.5

*No significant seasonal variations in the water-content of the bronchial portion of the lung of cats were observed.
**No observations were obtained upon human specimens from August to January.

means. The data so obtained are contained in Tables I, II and III.

The water-content of the trachea.—In all species studied the water-content of the tissues of the trachea fell at some period during the winter months. In albino rats, this "drying season" was from November to February inclusive, in guinea-pigs from October to January inclusive, in rabbits from January to February inclusive, in cats from November to January inclusive and in man during January and February. The mean percentages of water in the trachea at these seasons together with their standard errors ("St. error" in the tables) and the corresponding values during the remaining months of the year were calculated and presented in Table I. From these figures and the analysis of their significance presented in the right hand column of Table I, it may be seen that the trachea of each species was significantly more dry at some period during the winter months than during the rest of the year. In the case of the human trachea the mean water-content was also lower in the winter months, but the difference between this value and the mean for March to July was not great enough to be statistically significant with the small number of specimens available. Since the drying occurred consistently in all other mammals, it is likely that a larger series of human cases would have revealed a significant lowering of tracheal water during the winter months in man as well. The human specimens were taken from autopsies in which there was relatively little pulmonary disease, but it is obvious that the procedure could not be standardized to the same degree as in animals. For example, the respiratory tract of animals was dissected out immediately after death; in man, the interval between death and autopsy varied considerably, of necessity.

These results justify the conclusion that in the mammals studied there occurred at some period during the winter months, an interval of several weeks or months during which the tissues of the trachea had appreciably less water than at other seasons of the year.

The water-content of the alveolar portion of the lung.—Approximately one-third to one-half of the periphery or centrifugal part of each lobe of the lungs was cut off as previously described[2] and these collective sections were

termed the alveolar portion of the lung as they consisted histologically mostly of alveolar tissue with few larger bronchi or bronchioles. For the most part the water-content of the alveolar portion became appreciably less at about the same time as did the water-content of the trachea. This was especially true of albino rats and guinea-pigs. In rabbits the drying period of the alveolar portion extended from November to March inclusive, while the drying period of the trachea was restricted to January and February. It was not possible to detect any drying period in the case of the alveolar portion of the cat lung. In the human lung, the drying period of the alveolar portion was confined to January. The various data relative to these periods have been summarized in Table II. It may be seen that the water-content of the alveolar portion of the lungs is a rather constant value and that even in the drying seasons, the decreases in water content were less than in the instance of the trachea. Nevertheless, the drying was statistically significant in all species, except the cat, in which no drying period occurred.

The water-content of the bronchial portion of the lung.—That portion of the respiratory tract left after removal of the trachea and peripheral slips was referred to as the bronchial portion of the lung because it contained a good deal of bronchi and large bronchioles histologically, though, of course, there was alveolar tissue also. That this division of the lung into alveolar and bronchial portions resulted in samples of significantly different water-content has already been shown.[2]

From the data given in Table III, it may be seen again that in all species except the cat there occurred a significant drying of the bronchial portion of the lung at some period during the winter months.

The water-content of the respiratory tract of mice.—Because of the small size of the respiratory tract of mice, no attempt was made to subdivide it but rather the water content of the whole respiratory tract was measured in a total of 146 white mice. The drying season in this species occurred from September to November inclusive, rather earlier than in the other mammals. During the drying season, the mean water-content of the whole respiratory tract was 77.2%, with a standard error of 0.12. In the moistening season from December to August inclusive, the mean water content was 79.5% with a standard error of 0.09. Because of the large number of animals and of the relatively slight variation, the quotient of significance was quite high, being 15.3.

DISCUSSION

The various data presented above are quite consistent in demonstrating that at some period during the winter months and in this climatic and geographical area of southeastern Ontario, there occurs a significant drying of some or all parts of the respiratory tract of white mice, albino rats, guinea-pigs, rabbits, cats and man and, as previously demonstrated,[3] of pigeons and cockerels. These and previous experiments have been made purely with the view of establishing that this winter drying is of general significance amongst at least the warm blooded vertebrates, birds and mammals. No experiments have been made upon the significance or etiology of this phenomenon to date. It is probably not related to diet, because in the case of the white mice, albino rats, guinea-pigs and rabbits, the animals had the same diet and all of the water which they wished to drink throughout the entire year. Cats were used soon after obtained and their previous diet, as well as that of the human cases, was unknown.

The possible relationship to atmospheric relative humidity is a problem which remains to be explored. The general animal quarters of the building in which the animals herein used were kept are not air-conditioned. Experiments are now being designed to investigate the effect of relative humidity because normally in the winter months, the relative humidity of the animal rooms fell to very low values of from 10 to 20%.

The shifts in body water occur in response to exposure to heat or to cold noted especially by Barbour and his associates,[5, 6] would not seem, on superficial examination at least, to be responsible for the data herein recorded. Thus the albino rats used above were kept throughout their entire life in quarters heated in the winter months and at approximately the same temperature the year through.

Finally, these studies serve to emphasize the importance of seasonal variation in bodily functions, an aspect which is sadly neglected in most studies of bodily functions. Studies of this type might provide a more rational basis

for the understanding of the cause and treatment of the many human ailments which are peculiarly related to season.

SUMMARY

Estimation at monthly intervals of the water-content of the trachea, the alveolar portion of the lung and the bronchial portion of the lung of 105 albino rats, 115 guinea-pigs, 146 rabbits, 90 cats, 146 white mice and 11 cases of human autopsy material revealed that a statistically significant drying occurs in one or more of these portions of the respiratory tract over a varying interval during the winter months in this locality of southeastern Ontario.

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THE INDICATIONS FOR COMMON DUCT EXPLORATION

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ONE who studies, or is even interested in, diseases of the biliary system soon becomes impressed with the all-important rôle played by the extra-hepatic ductal system. One will also be equally impressed at both the absolute and relative neglect which this system receives. The gallbladder is too often considered to be a "North Star" of all biliary pain or indigestion, which will lead to the cause and the cure of all suggestive symptoms. If this were true, biliary disease would present one of the simplest of all conditions found in medicine, from the preventive as well as the curative viewpoint. But it is not so. Instead, it presents one of the most complex situations. There are few other conditions which have so high an incidence of frequency and give as unsatisfactory end-results in general practice.

The biliary system begins in the smallest radicles in the liver and consists of the liver as a whole and the individual liver cell as the basic functioning unit, the intrahepatic bile channels, the hepatic ducts, the cystic duct and its sphincter-like mechanism, the gallbladder, the common duct, the pancreas and its excretory system, the sphincter of Oddi, the ampulla of Vater and its physical mechanism, the duodenum with all its mechanical and functional intricacies, as well as the lymphatic circulation of the whole area. Truly this is a large and extensive system, which functions normally only when the physiological, anatomical, and neuromuscular segments are working in perfect co-ordination, and it is reasonable to believe that, as in any large piece of machinery, the breakdown of any one part will affect any or all of the remaining parts.

Because of these facts it is obvious that the removal of a gallbladder may have little or no effect on biliary disease in general, or on the separate basic symptom-producing factors. The doctor who sees many cases of gallbladder disease will sooner or later learn that the patient who has had a cholecystectomy, particularly if there is no preoperative treatment or postoperative supervision, will come back to him, or more often go to someone else, because operation did not remove, let alone cure, the symptoms for which operation was done. One of the chief reasons for this is residual disease in the ductal system.

A fundamental point is this: *biliary disease is progressive* and the resulting complications and associated conditions, both in and out of the ductal system, may in time become more serious and dangerous than the original disease. Such complications include liver and kidney deficiencies, infection of the biliary channels in and out of the liver, and obstructing pancreatitis. Therefore the mortality associated with secondary operations is obviously much higher than it is with the primary. The causative factor in the majority of secondary operations on the biliary system is, as just mentioned, residual disease of the common duct. Therefore it must be emphasized that every primary operation on a patient with gallbladder disease is a potential common duct exploration, particularly if bladder calculi have been diagnosed preoperatively. Because common-duct stones are so often overlooked at the time of cholecystectomy, the author drains the cystic duct through a small catheter

after the removal of the gallbladder if the common duct is not opened. This is done as a routine and it performs the same principal functions as a T-tube drain of the choledochus, namely, it allows perfusion and cholangiography. If cholangiographs are made by this method, in every case in which the common duct is not drained, the incidence of overlooked common-duct calculi will be reduced to a minimum, and, of course, the incidence of symptoms following cholecystectomy will also be reduced. It is obvious, too, that the mortality resultant upon secondary operations will also be markedly lessened, because the calculi will be removed before longstanding and intermittent obstruction has damaged the liver and upset the normal physiochemical balance.

Every operator who subjects a patient to cholecystectomy (so often sadly called "simple") should, of course, be able to recognize additional pathological changes and be able to successfully perform any procedure which is indicated by such unexpected findings.

INDICATIONS FOR EXPLORATION

It therefore seems proper to discuss generally, but briefly, the indications for opening, exploring and perfusing the common duct, and the relationship of the ductus choledochus to the biliary system as a unit. The indications for choledochotomy, or at any rate the conditions which demand serious consideration, can be grouped as: (*a*) those determined before operation, and (*b*) those determined at operation.

(*a*) *Those as determined before operation*: (1) a history of jaundice, particularly if repeated; (2) involuntary attacks of vomiting with the attacks of colic; (3) an increasing frequency of attacks; (4) Charcot's so-called syndrome of colic, fever, chills and jaundice (clinical history of cholangitis); (5) persistence of a biliary fistula following operation; (6) when symptoms following cholecystectomy demand operation; (7) chronic non-calculous cholecystitis.

(*b*) *Those as determined at operation*: (1) the presence of lesions which necessitate perfusion (pancreatitis, hepatitis); (2) the palpation of stones in the common duct; (3) a distended or thickened duct; (4) a small fibrosed gallbladder, particularly if the cystic duct is dilated; (5) the presence of many small bladder stones; (6) aspirated bile from the common duct showing a cloudy or hazy appearance; (7) an enlarged or otherwise pathological pancreas; (8) a pathological liver.

Independently or in combination the above conditions must be considered seriously. At this point it should be emphasized that the history must be thoroughly studied and completely understood before the operation is started. Unless this is always done the surgeon will some day make a serious mistake. Such mistakes are not always unavoidable but they should be reduced to a minimum.

There is no added danger if a normal duct is opened, provided this is well done, and, if it is diseased the danger of exploration at the first operation is much less than it would be at a second operation.

(*a*) AS DETERMINED BEFORE OPERATION

1. Repeated attacks of jaundice, particularly if preceded by colic, indicate intermittent obstruction of the common bile duct. The most common cause of this is one or more stones. In this respect it is wise to remember the widely proved axiom that "the most common things occur the most often", *i.e.*, that jaundice appearing in known or suspected biliary disease is the result of calculus and inflammation more often than not. Pancreatitis usually gives slowly progressive obstruction and rarely is it severe enough to produce progressive jaundice, unless it be malignant. It produces obstructive symptoms early, but few signs until late. Pancreatic icterus usually occurs slowly. The changes are not rapid and quick as they usually are with stones. Anyway, such pancreatic disease is so often associated with advanced biliary disease that either one demands that the common duct be explored and, maybe, perfused. Repeated or fluctuating icterus is, therefore, one of the strongest indications for choledochotomy, even though non-calculous cholecystitis may sometimes produce the same findings. (Acute hepatitis. It is really the conditions associated with non-calculous cholecystitis.) A stone must be diligently searched for, particularly if any of the other indications, as outlined above, are present. The finding of one stone should not mean the end of the search. Every effort must be made to make sure that none remain.

On the other hand an absence of jaundice does not mean an absence of common-duct stones. An average of only 65 to 75% of pa-

tients with calculi in this passageway produce enough rise in the bilirubin to show a visible jaundice, but an icteric index is easily performed and repeated determinations will often show small changes (latent jaundice) before visible jaundice appears. This should be done in every suspected case and it may indicate the presence of common-duct stones before clinical jaundice is seen. It is well to remember this fact, namely, that approximately one out of every four patients with common-duct calculi will show no visible jaundice. Mid-epigastric colic or pain is thought to be a more constant and more important finding than jaundice, although statistics say that one in five patients with proved common-duct stones have no colic (pain). Both colic and jaundice are end-results of the obstruction, and theoretically colic or suggestive pain should be more frequent because ductal distension due to back pressure must be present before such back pressure is high enough to produce jaundice.

2. It has been shown experimentally and clinically that distension, or merely mild back pressure, in the common duct will produce reflex vomiting. This is involuntary and will occur even in anæsthetized dogs. Balloons placed in the common duct of patients, and inflated days and weeks later consistently produce attacks of vomiting. Therefore, attacks of frequent and involuntary vomiting, especially if accompanied by colic, pain, or merely epigastric distress, particularly in the presence of known biliary disease, are presumptive evidence of common duct stone. Distension of the gallbladder does not always produce vomiting, even if the peritoneum is involved, and is much less likely to do so under any conditions.

3. When attacks of pain or colic, with or without vomiting, occur more than twice a month (approximately) or, more particularly, when attacks become more frequent and last longer than they originally did, the presence of common-duct stones should be suspected. Although this applies to any case, it is more applicable to those patients with mid-epigastric pain, jaundice and vomiting than it is to patients with right sub-costal pain, less jaundice and little vomiting.

At this point a word should be said about "biliary colic". Clinical biliary colic is not "colicky". It is a severe pain which increases in severity until it reaches a climax, and it does not disappear until the cause has been relieved or drugs administered. Also, common-duct pain is usually mid-epigastric in location rather than right sub-costal and is more likely to radiate directly through to the mid back. Indeed, many authorities open the common duct on this finding alone, *i.e.*, repeated epigastric crampy-like pain, particularly if this pain radiates straight through to the back. Colic and jaundice, however, are proof of biliary disease, and although this may be produced by cholecystic disease in the presence of a normal ductal system, choledocholithiasis is a much more common cause and must always be carefully ruled out. It should be appreciated, too, that functional changes can simulate organic disease even to the point of colic and jaundice.

Cystic-duct colic (obstruction) produces changes in the size of the gallbladder, if non-fibrotic, which in turn produces varying amounts of peritoneal irritation with resultant right sub-costal pain. Hence a difference, in many cases, in the location of ductal colic and gallbladder colic. The former is also more commonly associated with involuntary vomiting.

4. The syndrome of colic, jaundice, chills and fever has long been associated with choledocholithiasis, and for practical purposes it is pathognomonic of common-duct calculus. Fortunately, the incidence of this combination (Charcot's syndrome) is not as common as it formerly was because preventive surgery is practised more today than it was in the days of less understood biliary physiology and pathology. It is a serious danger signal and diagnosis should be made before this stage has been reached. It indicates a relatively poor prognosis, because liver involvement is always moderate and often advanced. To compare the incidence of chills and fever with colic and jaundice we find, approximately, that out of 100 patients with common-duct calculi, 20 will have no colic, 25 will have no jaundice, and 65 will have no chills and fever. In other words, only 4 in 5 will have colic, only 3 in 4 will have jaundice, and only 1 in 3 will have chills and/or fever. The finding of either chills or fever with colic and/or jaundice is of the greatest diagnostic importance, and has more clinical significance than the appearance of colic or jaundice, either alone or in combination.

Even an apparently normal ductal system would not be a contraindication to exploration, if enough of these indications are present. It would indicate, however, that the obstruction

was, in all probability, above the junction of the hepatic and cystic ducts. The removal of calculi in this location may involve the most difficult and potentially dangerous of all surgical procedures. The chills and fever are a result of an obstructive and infective lymphangitis along the intra-hepatic bile ducts (hepatitis and cholangitis) and the resulting bacteriæmia. These findings therefore indicate long standing or severe disease with a minimum of liver reserve. So-called infected bile seldom produces a hepatitis, because actually bile is seldom infected. Infection travels by the lymphatics, not through the bile stream.

A clinical axiom of the greatest importance is that "a patient with a rising bilirubin figure should never be subjected to operation". Operation should be postponed until the icteric index has fallen to normal, or at least until it is stationary. This is, however, not an infallible rule. To operate in the presence of a rising icteric index is to ask for trouble, and trouble comes often enough without an invitation. There is one notable exception to this, namely, the presence of increasing infection which must be drained from the biliary system as it is drained elsewhere in the body. A two-stage procedure is the one of choice in such patients. It may also be of value in certain patients with inflammatory obstructive jaundice. The decision may well mean the difference between life and death for the patient.

5. A persistent fistula draining bile from the common duct is proof of major or minor obstruction to the ductal flow of bile, usually at the point of the former operative work, or between this point and the outlet. Such a case must be explored and the obstructing barrier repaired. This will also, in the majority of cases, demand the maximum of experience and surgical handiwork. A stricture or remaining stones are the common causes of fistulæ.

6. When symptoms, such as pain, colic, dyspepsia, vomiting, etc., follow gallbladder removal the law of averages favours: (*a*) that the diagnosis was wrong and the symptoms are due to other disease, particularly if the common duct was explored at the first operation; (*b*) that common duct stones were missed at the first operation; (*c*) that there is a stricture of the common duct; (*d*) that pancreatitis is present. However, a not uncommon cause of post-cholecystectomy symptoms is the failure of the patient to follow a diet. Hence, if a thorough examination rules out other disease processes, and if medical treatment fails to give relief, re-operation for common duct exploration is definitely indicated, especially if careful studies show changes in the level of the blood bilirubin. Cholangiography, in those patients who have a T-tube in the common duct or a small catheter in the cystic duct, following the first operation, or a drainage tube in the gallbladder, will often prove the absence or presence of stones and may, furthermore, show a chronic pancreatitis. The latter may occasionally simulate common-duct stone even to the point of jaundice, chills and fever. Other causes of post-cholecystectomy symptoms are: functional changes, partial duodenal obstruction and malignancy. For obvious reasons cancer must always be kept in mind.

7. It is a well-known fact that better results follow cholecystectomy for stones than for non-calculous cholecystitis. When stones are removed, the causative factor, or at least one of the principal causative factors, is removed, but this is not so in the case of the non-calculous bladder. In the latter instance only one small segment of a diffuse area of disease is removed, and there remain variable amounts of disease throughout the liver, pancreas and the ducts. The presence of stones means obstruction of, and often progressive infection in, the gallbladder. In other words, the calculous bladder has a greater degree of disease and infection than the non-calculous bladder. The latter is rarely associated with choledocholithiasis, but I believe that it is always part and parcel of diffuse biliary disease, which must be treated, and that it is not treated directly by cholecystectomy. It can be treated and attacked directly by ductal perfusion coupled with properly supervised medical treatment. Non-calculous cholecystitis is therefore a considered indication for choledochotomy with cholecystectomy, and for postoperative perfusion, because, if symptoms and disability are severe enough to demand the removal of a non-calculous gallbladder, the symptom-producing disease must frequently be present in the remainder of the system, and, to repeat, this is not always affected, or cured, by removing the gallbladder.

(*b*) As Determined at Operation

1. The disease which necessitates perfusion may be in any part of the biliary system. Part of this system can be seen and examined; part

cannot. T-tube drainage of the common duct or catheter drainage of the cystic duct does not always clean the intra- and extra-hepatic ductal system as thoroughly as does the internal lavage which is induced by perfusion. The application of heat is also most beneficial and can be applied to the actual seat of the disease. The indications for opening the common duct are also indications for drainage and therefore for perfusion. Future work may show that perfusion is of value as a preventive as well as a therapeutic agent, in those cases which do not now show indications for exploration. (See Section (*a*) number 7.)

2. The palpation of stones in the common duct is, of course, the most definite indication for exploration. These cases should be all drained and perfused. It may at times be difficult to differentiate hard portal lymph nodes from stones, and indeed it may be impossible to palpate even large calculi, particularly if they are in the distal end of the duct. Calculi move in the long axis of the duct whereas lymph nodes are movable in all directions. Usually the latter are not as hard and resistant (unless malignant) as a calculus. It should be remembered that stones may rarely be present in the common duct even though none are present in the bladder, and they can often be present without any of the more usual findings.

3. A dilated or thickened duct is proof positive of the presence of disease. This usually is a stone (or stones) which has produced an incomplete or transitory obstruction with infection. The stone is not always palpable. Such a condition is most often found associated with a past history of pain and vomiting and often jaundice. However, a diseased duct may also result from a direct extension of the infection from the gallbladder wall along the cystic duct. When this happens the dilatation is not so great as it is when obstruction has been present, and the presence of infection may be indicated only by thickening. It is obvious, of course, that a dilated, thickened or otherwise diseased duct, cannot be seen unless a definite effort is made to look for it. In other words every cholecystectomy demands a thorough visual examination of the ductal system. Indeed, even if the gallbladder is found normal, the common and hepatic ducts must nevertheless be examined if the history indicates, or even suggests, obstructive biliary disease.

4. A small, fibrosed gallbladder indicates long standing and progressive inflammatory disease, and experience has shown that many of these cases have associated common-duct disease, whether or not stones can be palpated, and exploration is always indicated. A normal duct is a rare operative finding with such a bladder. A dilated cystic duct indicates increased ductal pressure and is an added indication. Any evidence of increased pressure means intermittent, semi-permanent, or transient obstruction.

5. When large numbers of small stones are found in the gallbladder it is easily understood how one of these might have passed through a large cystic duct into the common duct. When this condition is found the common duct should be explored regardless of its size, consistency, or normal palpability, and drainage should be instituted through either the cystic or common ducts. Abnormal bile will practically always be present if the duct contains stones. A combination of a fibrotic bladder containing many small stones and a dilated cystic duct is evidence that *always* demands exploration.

6. When any doubt exists about opening the duct a small hypodermic needle should be used to withdraw some bile. The needle should be inserted at an angle so that leaking will be minimum if the duct is not later opened. The location of the hepatic artery and portal vein must be known. This procedure is also a test, and sometimes a vital one, to differentiate the common duct and the portal vein. This is not a theoretical difficulty, particularly in long standing and active disease. If the aspirated bile is held in front of a bright light any flecks, cloudiness, or debris, can easily be seen. If these are found it indicates common duct stagnation or, at least, an absence of a normal flow, and it is a definite indication for exploration. On the other hand, clean and transparent bile usually indicates a normal system. However, the writer has seen three cases of common-duct stone associated with clear bile, one of which had a negative culture. A microscopic study of aspirated bile undoubtedly gives more information than visual examination.

7. The presence of a large pancreas usually indicates extensive disease in the biliary tract (pancreatitis is a complication) and in many cases it produces a partial, and sometimes a complete, common duct obstruction. It is a not uncommon cause of post-cholecystectomy

symptoms and, if present, therefore, is usually an indication for drainage and for perfusion, because, if the enlargement is due to a chronic inflammatory process heat by perfusion is a logical therapeutic measure. If, on the other hand, ductal infection is still present, whether or not partial obstruction is a factor, perfusion with increasing pressure is indicated, both for cleansing the duct and for dilatation of the sphincter. Obstruction of the common duct is never present for any length of time without infection being added.

8. A diseased liver, especially if large, is a definite indication for prolonged drainage and internal hepatic lavage by means of perfusion.

ACUTE CHOLECYSTITIS AND CHOLEDOCHOTOMY

The question of medical or surgical treatment for acute cholecystitis is a debatable one and although many surgeons are beginning to favour conservative treatment, particularly if the cases are not seen early, radical treatment has very much in its favour but the decision must always be an individual one. (Early and late cases should refer to the pathological, and not to the clinical, age.) It is certain that one of the better arguments against radical surgical treatment during the acute attack is the fact that the common duct cannot be explored with maximum ease and safety, or the optimum thoroughness, while the acute disease is prevailing. (Surgical treatment may be conservative, *i.e.*, the two-stage procedure). It is often impossible to palpate common-duct stones when they are present in the chronic stages (non-acute cases), and it is obvious that this difficulty is greatly increased by the presence of œdema, congestion, swelling and other acute manifestations. However, there are occasions when the common duct can be explored during cholecystectomy for acute disease, but expert surgical technique and great clinical acumen are imperative prerequisites.

The writer has advocated a two-stage procedure for certain cases of acute cholecystitis. The first stage (simple and quick drainage) prevents the dangers consequent upon the acute phase (empyema, necrosis, gangrene, pericholecystitis, fistula formation, perforation) which are more common than was formerly thought, and it also allows the serious and dangerous secondary operation (removal and, probably, ductal surgery) to be done with greater technical safety. The normal physiochemical balance will also have become restored.*

CONCLUSIONS

Successful gallbladder surgery often depends upon successful common-duct surgery, and this ranks high among that group of surgical procedures which requires the best in the technique and judgment of the surgeon. This is true of either preventive or curative treatment. It is impossible to place too much emphasis on the preventive aspect of choledochus disease at the time of cholecystectomy. In no sphere of surgery is the axiom "prevention is better than cure" more true than it is in this condition. It is not possible to give reliable statistics regarding the incidence of patients whose suffering following operation is preventable because all such figures are founded on large teaching hospital and clinical records, whereas the greater number of patients with common-duct disease are seen, and treated, for the first time in general practice. However, it can be said with no hesitation that an unnecessarily large number of these cases are preventable, and because many are eventually fatal it follows that many deaths are preventable.

SUMMARY

The principal clinical indications for exploring and perfusing the common duct are discussed.

The principal indications for choledochotomy (with individual reservations) are noted as those which can be determined before operation and those which have to be determined at operation.

Each condition is discussed as a potential indication for common duct incision, exploration and perfusion. Also, the relation of residual common duct disease to persistent and progressive changes in the biliary system and to post-cholecystectomy symptoms, is stressed.

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* *Re* the blood vessels. A branch of the gastro-duodenal artery or superior pancreatico-duodenal artery, and sometimes of the cystic artery, as well as veins, which lie in the peritoneal covering of the common duct can give troublesome and serious bleeding if the vessels are not identified and controlled during opening the peritoneum in the hepato-duodenal ligament, and if the duct is not clearly and cleanly exposed. Uncontrolled bleeding is, with the probable exception of exposure, the most important single factor which predisposes to the difficulties and dangers of gallbladder surgery. It obscures the field, prevents good vision, causes trauma in the wound and abdominal viscera, predisposes to big and promiscuous bites of tissue and therefore to strictures.

ADDENDUM

Since this paper was submitted the writer has operated upon a case worthy of mention. Two previous operations had been performed elsewhere—one for drainage and one for removal of gallbladder. Symptoms (jaundice, chills?, fever?, high mid-line pain, vomiting, loss of weight, general health decreased) increased and jaundice fluctuated. Diagnosis: (1) common duct calculi; (2) stricture? (inflammatory). All evidence greatly in favour of calculus. Cholangiogram performed on operating table revealed no negative or positive shadows. Catheter and large sounds passed easily into the duodenum but because the *clinical history* said a stone was present the duodenum was freely mobilized and the duct followed to its termination. A soft cholesterol stone was discoveral. *Moral:* the clinical history must weigh the balance of diagnostic facts.

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Case Reports

UNILATERAL PYELONEPHRITIS AND HYPERTENSION

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The case herewith reported may be of interest in view of the lack of data on the frequency of this syndrome.

Mr. E.G., aged 49 years, was admitted in coma, to the Homœopathic Hospital, of Montreal, May 26, 1942. His history gave no clue to the cause, except that six months previously he had been discharged from the army on account of hypertension.

He himself had felt perfectly well, and until the day of his final illness had been doing heavy manual work. On returning home at 6 p.m., May 25, he complained of not feeling well, and of a bubbling sensation at the back of his chest, and went to bed. Soon after, his wife found him unconscious, breathing stertorously, and soaked with perspiration. The respiration soon took on a Cheyne-Stokes character, and neurological signs developed in the form of moderate irritability on the left side, and mild hemiplegia on the right.

On admission, the patient was in deep coma, and incontinent. Moist, bubbling râles were heard throughout the chest, thick white mucus was dribbling from the corners of the mouth, and there were bubbling râles in the trachea. The skin was cold, with profuse sweating. For a great part of the time, the patient appeared to be almost in a state of decerebrate rigidity, with pupils fixed and eyeballs rolling. Reflexes were diminished in both lower extremities, but increased in the upper. There was a bilateral Babinski reflex, and the tongue protruded to the left. Blood pressure 200/100; temperature 104°; pulse 140; respirations 40.

Lumbar puncture yielded a normal spinal fluid, with no evidence of increased pressure or block. A faint fruity odour to the breath suggested diabetes. Blood-sugar was 204.1 mgm. %, but the urine was sugar-free. Unfortunately, in spite of 1+ albumin, a microscopic examination was not done, nor was a blood non-protein nitrogen.

On the clinical picture and the history a provisional diagnosis was made both by the family physician and the hospital staff of cerebral hæmorrhage. Therapy was continuous oxygen, coramine, and insulin. The patient died, without recovering consciousness, on May 28, 30 hours after admission.

At autopsy, no pathological changes were found in brain or pancreas. The significant features were purulent bronchitis, with evidence of chronic passive congestion; hypertrophic gastritis, with free blood in the stomach; an extensive exudative and proliferative pyelonephritis

of the right kidney, with right hydroureter. The cause of the obstruction could not be determined. The capsule of the right kidney stripped with difficulty, leaving a fairly smooth surface. The renal pelvis was markedly dilated, infringing on the parenchyma. The cortex and medulla were poorly differentiated, with reddish streaks extending up into a yellowish cortex. Section showed extensive inflammation, obliterating wedge-shaped areas of parenchyma, with exudate chiefly mononuclear. The left kidney and ureter were normal.

In view of the tentative diagnosis made on this case, one is led to wonder how many cases of sudden unconsciousness and death in known hypertensives are certified as cerebral hæmorrhage by the attending physician, when the underlying cause is unilateral pyelonephritis and there has been no cerebral hæmorrhage.

A CASE OF SUSPECTED CAVERNOUS SINUS THROMBOSIS WITH RECOVERY

By Surg. Lt.-Cmdr. G. E. Verity, R.C.N.V.R. and Surg. Lt. J. F. Elliott, R.C.N.V.R.

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This is the report of a case of suspected cavernous sinus thrombosis. It is "suspected" because we have not all the points necessary for a definite diagnosis; on the other hand, we are at a loss to place it in any other category.

The patient was an ordinary seaman, aged 18, who was admitted to the Royal Canadian Naval Hospital, Halifax, on February 17, 1942, with a diagnosis of right frontal sinusitis. He had been treated for a common cold at sick bay for approximately nine days previously. He states that the nasal discharge was thin and clear rather than thick and purulent.

The night before admission to hospital he struck his forehead on a metal lamp support after getting into his hammock. He apparently did not lose consciousness, but felt dazed, lay back in his hammock, and went to sleep. On awakening the next morning he felt a steady, severe pain over the medial end of the right eyebrow which radiated to the temporal region later in the day. He reported to sick bay and hospitalization was advised.

On admission his temperature was 102°; pulse 100. Ice was applied to the frontal area, A.P.C.&C. tablets were given for pain, and ephedrine nose-drops. I saw him for the first time on February 18th. His temperature was still elevated; there was a slight exophthalmos of the right eye; no marked tenderness over the anterior wall of the frontal or upon pressure on the floor of the sinus. There was, however, definite tenderness on pressure over the eye itself. Examination of the right nasal passage showed very little congestion of the nasal mucosa and no purulent discharge was seen. There was, however, a moderate amount of post-nasal discharge which was muco-purulent in character. An x-ray of the sinuses was ordered and this showed a density in the right ethmoid and right antrum, but, in my opinion, no involvement of the right frontal. Prontylin was ordered.

The following day the patient had a chill and his temperature rose to 103°. The exophthalmos had increased. He was markedly toxic and the prontylin was changed to sulfathiazole after consultation with Surgeon Lieut.-Commander MacLeod.

The following morning the temperature had dropped to normal and the patient felt and looked much better. However, that afternoon he had another chill, with a temperature rising to 105°. By this time there was a more marked proptosis of the eye, a slight chemosis of the conjunctivæ and definite limitation of lateral movement of the eye. Examination of the left fundus showed a slight dilatation of the retinal veins; no papillœdema. I advised admission to Camp Hill Hospital, where he was seen by Dr. R. H. Stoddard who agreed with me on a tentative diagnosis of cavernous sinus thrombosis. Treatment with heparin and soludagenan was immediately started.

During the next twenty-four hours there was a definite increase in the proptosis, and a definite increase in the limitation of movement to the right and also, to a slight extent, upwards and downwards, but no limitation of movement to the left. At no time was there any marked nasal congestion suggesting an acute pan-sinusitis. Ears were negative. Examination of the throat was negative, except for many carious teeth. The rest of the physical examination was essentially negative.

Past illnesses.—Patient had the usual childhood diseases; also, from the age of six to fifteen he was under observation and treatment for pulmonary tuberculosis. Another interesting fact is that he had always had a tendency to excessive bleeding as evidenced by hæmorrhage following tonsillectomy, teeth extraction and circumcision.

Family history.—He was under observation for tuberculosis from the age of six to twelve; otherwise unimportant.

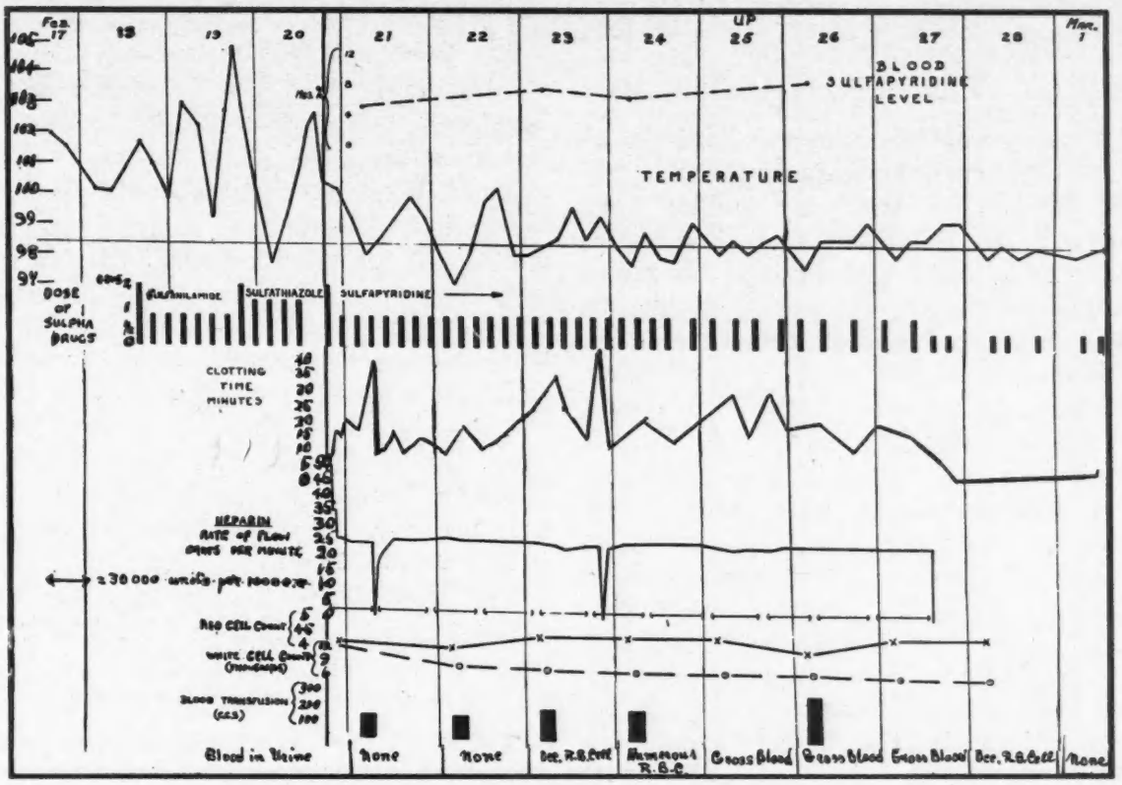
Treatment.—When the patient was transferred to Camp Hill Hospital on February 20th, treatment was instituted (by J.F.E.) as described by Lyons[1] and Schall.[2] He received sulfapyridine and heparin plus multiple blood transfusions. The chart illustrates his subsequent course.

Sulfapyridine was chosen because it was most readily obtainable for parenteral administration (it is known to diffuse well into the spinal fluid) and 8 grams of sulfanilamide and 8 grams of sulfathiazole previously given had shown little effect. As a blood culture taken on admission showed no growth, and the patient's response seemed adequate, no change to other sulfonamides was made. The dose given was 2 grm. on admission, and 1 grm. every four hours for four days, after which the dose was gradually decreased until the drug was discontinued on March 2nd. For the most part it was given as the sodium salt[3] diluted in distilled water and injected through the rubber tubing of the intravenous set into the heparin solution. After heparin was discontinued it was given by mouth. In all, he received 39 grm. in nine days. The blood sulfapyridine level during the first six days of treatment varied from 4.9 to 8.5 mgm. %.

Heparin was administered for seven days by the continuous intravenous drip method. A coagulation time of between fifteen and thirty minutes was considered satisfactory.[4] Three vials of heparin (30,000 units) were added to each 1,000 c.c. of 5% glucose in normal saline. It was discontinued when the patient had been up for two days, with his temperature staying below 99° F. Thirty-three vials (330,000 units) of heparin were used.

A small blood transfusion was given daily for four days, and one on the sixth day, a total of 1,000 c.c. of citrated blood. It was believed that these transfusions helped to combat a severe acute infection and also replaced the blood lost in the urine and that destroyed by the sulfapyridine.

After the first twenty-four hours the clinical course was one of rapid improvement. At no time was there any sign of meningeal irritation. No more rigors



occurred, and after the third day the temperature did not rise above 99° F. The eye signs subsided, so that by the fourth day the right eye appeared normal in all respects. Proptosis, œdema and tenderness had disappeared and there was normal range of motion in all directions. The corneal reflex had returned to normal and there was no longer hyperæsthesia around the eye. He was allowed up on the fifth day; heparin was discontinued on the seventh day, and sulfapyridine on the tenth day. He now feels well except for fatigability. His present weight is 180 pounds, which he states is 35 pounds less than before his illness.

Three complications were encountered, epistaxis, vomiting, and hæmaturia. Recurrent nosebleeding occurred throughout the period of heparinization, but was always easily controlled by a small anterior pack.

Vomiting was marked throughout the first week and necessitated parenteral administration of fluid and sulfapyridine. It usually was worse shortly after his dose of sulfapyridine and could probably be attributed to this. Injection of the diluted drug in the heparin solution resulted in less vomiting than intra-muscular injection. When the dose was decreased to 0.5 grm. t.i.d., vomiting stopped entirely. His appetite is now in keeping with his height of 6 feet 6 inches.

Hæmaturia has been described as a complication of this method of treatment.[5] In this case a few red blood cells were found in the urine on the third day of heparinization. The following day red cells were numerous, and for the next three days the urine was smoky, with gross blood. The day after the heparin was stopped only a few red cells were present and since then there have been none. No sulfapyridine crystals were found in the urine, there had been no apparent reaction to the blood transfusions, there was no hypertension, and no casts were found in the urine. It was concluded that the hæmaturia was due to the hæmorrhagic diathesis produced by heparin, though possibly initiated by sulfapyridine. In view of the serious prognosis of the condition probably present it was decided to continue treatment and to replace by transfusion the blood lost. Sodium bicarbonate was given by mouth to keep the urine alkaline, and the urine output was kept above 2,000 c.c. per day. The bleeding time on February 23 was 8 minutes and on March 1, 4 minutes, which is interesting in view of the previous history of hæmorrhages.

SUMMARY

A case showing many of the signs and symptoms of cavernous sinus thrombosis has been presented. The probable route of infection was the right ethmoid sinus. The treatment consisted of sulfapyridine, heparin and blood transfusions. The complications were epistaxis, vomiting and hæmaturia. The patient recovered within a week.

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Editorial

WORK OF THE NARCOTIC DIVISION

THE report of the Narcotic Division of the Department of Pensions and National Health for the year ending 1941 contains its usual interesting review of the narcotic situation in this country. It shows an almost complete absence of all illicitly introduced manufactured drugs such as morphine, heroin, and cocaine, in all parts of Canada. Apparently, however, opium has continued to be available in British Columbia, though only at irregular intervals and at extraordinarily high prices. The sources are not indicated. The price, as might be expected, is fantastically high, a 7½ ounce can fetching between $600.00 and $700.00. Even De Quincey's imaginative efforts might have failed to conceive such costs! This naturally has put regular opium-taking entirely in the luxury class, and addiction to its smoking has diminished accordingly. Its replacement by hypodermic injection has been inevitable.

But this drastic shutting-out of illicit narcotics from abroad has not by any means solved the problem of addiction. There has been an undoubted decrease in the number of addicts and their numbers continue to lessen, but the efforts to obtain these drugs for illicit use are becoming more and more desperate. Opium has been quoted as commanding excessive prices, but these cannot be compared with the figures for heroin. In more than one locality there has been a steady demand for ¼ grain tablets of heroin at $3.50 each, and lately at $4.00 each. This gives a value to the drug of only a little less than $7,000.00 an ounce.

This leads to increasing attempts to obtain the drug illegally. Thefts from doctors' offices or from emergency bags and from other sources are on the increase. In 1938 for example, there were 46 thefts of narcotics, from 27 physicians, 18 druggists and one hospital. In 1941, these had risen to a total of 71 thefts, 46 from physicians, 29 from druggists and 4 from hospitals. One theft on a large scale was from a shipment of pantopon which left Switzerland in May 1940. It disappeared en route and was given up as lost, but a year later turned up at Martinique, whence it eventually reached Montreal minus some 20,000 tablets and 300 ampoules.

Another method which should be watched for is that of simulating medical conditions which call for relief of pain. Several prescriptions may be obtained by this means. The campaign against this kind of fraudulency has been supported by a court decision that the possession of a narcotic is illegal when it is shown that the second doctor supplying it did not know that the same condition for prescribing it had been used as an excuse to obtain previous supplies within a short time.

The legal trade in narcotics has been maintained at as desirable a level as might be hoped for under war conditions, but only by means of strict conservation methods.

The imports and consumption of codeine exceed all other manufactured drugs combined. The consumption, however, has been definitely lowered by the prescription requirements. The same effect on consumption is seen in the case of paregoric, particularly in such large centres as Toronto and Montreal.

Editorial Comments

Phosphorus Poisoning in Wartime

The employment of phosphorus in the present war is dealt with in some detail in our present issue.[1] The deadly properties of this substance are well-known, and it may be asked why so little about its use in warfare has appeared in the contemporary medical literature. The answer is that it has only recently been employed in its destructive capacity. The mixture of phosphorus and rubber in incendiary bombs referred to by Dr. Rabinowitch was evolved by the Japanese, and the measures to deal with its effects have only been perfected in the last six months.

Another of its forms is in the bullets now being used by the Germans. The *British Medical Journal*[2] has had detailed descriptions of these bullets from samples found in wrecked German planes. These bullets contain from

1. Treatment of phosphorus burns, I. M. Rabinowitch, this issue p. 291.
2. December 5, 1942, p. 664; January 23, 1943, p. 111, and February 6, p. 171.

three to ten grains of phosphorus, which, of course is much more than enough to cause death. There is also an explosive charge in the bullet to ensure a wide dispersion of the phosphorus. Two fatal cases have been reported from the effects of these missiles. Phosphorus fumes were noticed in the wounds in both cases. Signs of poisoning did not appear until the third or fourth day after the wounds had been treated and there had been apparent recovery. Death occurred on the fifth and sixth days respectively, from uræmia. Postmortem examination was carried out in the first case only (he was a Canadian airman), and the liver was found to show typical signs of phosphorus poisoning.

The treatment of superficial phosphorus burns has been fully described, but there seems to be no effective way of dealing with the poisonous effects of these bullets. If the track of the wound can be completely exposed and the phosphorus neutralized or flushed out there is a possibility of preventing absorption, but in deep or extensive wounds the problem is very difficult.

There have probably been more of these fatalities than those recorded, since they have not been looked for, and there will probably be more.

Teaching of First Aid

The apparent simplicity of first aid does not preclude the necessity of revising its teaching. The war has undoubtedly shown us wherein it can be altered or added to with profit. The first aider is not being asked to do more, but experience has shown that more emphasis should be laid on certain things and less on others. For example, the treatment of burns has assumed overwhelming importance. Possibly more emphasis should be laid on the simple cleaning of a burn before application of tanning agents. Too much zeal in the use of these latter sometimes results in a perfectly good tan over a surface covered with dirt.

To the methods of artificial respiration already taught should be added the so-called Eden method, which depends on rocking the patient horizontally rather than on rhythmical pressure. It has the drawback of not being so readily applied under all circumstances as is the Schafer method, but where it can be used it saves a great deal of physical exertion.

It is doubtful whether the first aider, as guided by his manual, sufficiently appreciates the potential danger of a tourniquet, nor perhaps does he fully realize how very seldom it is needed. The precautionary loosening of it may not be carried out for various reasons, and actually direct pressure with a dressing is usually enough.

The learning of pressure points for controlling hæmorrhage hardly seems to justify the amount of teaching devoted to it. As anatomical details they may be of some interest but it should be made clear that in practice they do not help very much.

Another point on which comment has been made is that of providing heat in cases of shock. On theoretical grounds there is a good deal to show that up to a certain point cold is not so serious a factor in shock as used to be thought. Certainly it is agreed that a patient in shock should not be overheated. But in dealing with first aid classes it is probably safer to emphasize the importance of conserving heat, rather than to make them trv to judge whether warmth is necessary or not.

There is probably no form of teaching in which statements have to be more direct and unqualified than in first aid.

Errata

In the article on Shock by the Subcommittee on Shock and Blood Substitutes of the National Research Council of Canada, several unfortunate, but probably obvious, typographical errors have crept in. These have been corrected in the reprints which are being sent out to all medical officers in the Canadian Armed Forces.

p. 198.—Last sentence, second paragraph (column 1) should read ". . . the pulse rate may *not* be altered. . . ."

p. 199.—Fourth paragraph (column 2) (Posture, etc.), second last sentence should read ". . . it may be *in*advisable to adopt. . . ."

p. 200.—Second paragraph (column 1) (General measures), first sentence should read ". . . should be given freely *except* to patients. . . ."

p. 203.—Last paragraph (column 1), 2nd last sentence should read "Local infiltration *or* block anæsthesia. . . ."

p. 205.—First paragraph (column 2) (Incompatibility reactions, etc.), 2nd last sentence should read "The urine, obtained by catheter, is red or brown due to free hæmoglobin *or* hæmoglobin decomposition products."

Re Phlebotomy. "This remedy, if we believe Pliny, was derived to mankind, like some others, from observing the operation performed by an animal on itself. The *Hippopotamus*, we are informed by ancient philosophers, when she perceives herself fat and unwieldly, moves about on the sharpest points of broken reeds, and having drawn blood from her feet and limbs, very surgically closes the wounds by a plaister of mud." —William Wadd.

Medical Economics

The Proposed Inauguration of a National Health Insurance Scheme in Canada

(The following memorandum was prepared by the Canadian Life Insurance Officers Association, and was submitted to the Advisory Committee on Health Insurance of the Department of Pensions and National Health. This committee was charged with the duty of formulating a draft plan of health insurance and public health services in Canada and willingly received the expression of views from responsible bodies. Whilst the memorandum deals with one aspect of the question only, we feel that it contains points of great interest.—EDITOR.)

1. GENERAL COMMENTS ON PUBLIC HEALTH MEASURES

We are limiting this first memorandum to the public health aspect for several reasons. One is that it has long been regarded as a proper and appropriate field for government action and involves much less controversial questions than health insurance. There is also apparently widespread agreement that an enlarged public health program is essential to preserve and improve the public health and is also an urgent need in view of present war conditions and the probable post-war situation. In addition, the problem is much simpler than health insurance, because of actuarial and other technical considerations which are of major importance in the latter field.

The basic purpose of any measure dealing with public health obviously is to improve the national health, thus reducing the rate of morbidity and mortality, and to maintain the national health at the highest level attainable. Any consideration of this subject immediately brings into relief the quite different nature of preventive as compared with purely curative measures. Our Committee has given much thought to the preventive aspect of the problem and in so doing has studied the experience in Great Britain and other countries. The treatment of such illness as cannot be prevented must naturally be undertaken, but there is quite a range of opinion as to the extent and the manner of the government's function in the field of curative services. It is generally recognized that proposals of such far-reaching importance as those of the draft plan for health insurance merit a searching examination of the experience in other countries, with a view to avoiding the difficulties and pitfalls that have been experienced elsewhere. Canada is in a particularly favourable position in this respect because, having no national scheme of health insurance at present, she is better able to profit by the experiences of others in formulating measures calculated to achieve the most favourable results with a minimum of administrative difficulty.

At the same time it is realized that too much reliance cannot be placed on the study of previous experiences abroad in fields so greatly subject to change and development as are public health and health insurance. Correctly to interpret and utilize the experience of others on such matters may be very difficult. Special national circumstances usually have an important bearing on the nature of, and the administrative arrangements for, social measures of any kind. The preliminary indications which reach us from Great Britain in respect to the activities of the Inter-Departmental Committee now conducting a comprehensive survey of social insurance and allied services under the Chairmanship of Sir William Beveridge suggest that recommendations for changes of a major sort, notably in the field of medical care, are about to be made in that country. Such recommendations will naturally tend in many respects to take into account conditions present in Great Britain and therefore may not have a great deal of applicability in such a country as Canada. For these and other reasons we feel it important to emphasize that any Canadian legislation in the fields of public health or health insurance should be based primarily on a thorough appreciation of the national circumstances, institutions, psychology, aspirations, etc., of the Canadian people rather than to rely too much on precedents from abroad, however well those outside methods may appear to suit the very different populations for whom they are designed.

2. COMMENTS ON THE DRAFT PLAN

It has been noted with approval that the draft plan deals with a number of preventive measures. For example, provision is made for grants to those provinces which provide treatment for persons suffering from tuberculosis, mental illness and venereal diseases. Similarly, the draft legislation contemplates that grants will be paid to provinces for the provision of public health services. In addition, assistance will be granted for the education in public health of physicians, sanitary engineers, sanitary inspectors and nurses; for the conduct of public health studies and investigations; and for the inauguration of physical fitness plans for the development of youth.

However, in the hope that this memorandum may be as definite and constructive as possible, we proceed to list some additional types of services and procedures which it is felt should be covered in any well-rounded public health program. It is, of course, recognized that important progress has already been made in respect of a number of these matters, but we believe that something further can be accomplished by way of developing a truly comprehensive and well-coordinated system of public health services.

Consultant services.—Co-operation with provincial (and local) health departments by providing consultant services in connection with a variety of technical activities, *e.g.*, public health engineering and industrial hygiene; control of cancer, tuberculosis and venereal disease; milk sanitation; nutrition; laboratory services, etc. We believe that, for many purposes these consultant services (particularly in the field of public education to which later reference is made) can be best provided by fully using the facilities already developed by health organizations now operating, *e.g.*, the Canadian Public Health Association, the Canadian Welfare Council, the Health League of Canada, the Canadian Dental Hygiene Council and the Canadian Tuberculosis Association. Our feeling in this respect is corroborated by the experience of the Canadian Life Insurance Officers Association in granting financial assistance to such organizations for many years.

Infectious and contagious diseases. — A program of field and laboratory research into the genesis, control, prevention and cure of epidemic diseases, including more comprehensive compulsory notification of certain illnesses, and practical steps to use the knowledge so gained.

Nutrition.—An intensive program of research and public education in the field of nutrition. It is recognized that meritorious steps have already been taken in this direction but much remains to be done. As one step, employers might be encouraged to provide well-balanced meals for their employees at their place of work. As a means of lending such encouragement consideration might be given to the feasibility of permitting employers to charge as a legitimate cost of operation for income tax purposes any expense thus incurred, provided, of course, that the meals offered to employees meet with certain minimum nutritional standards. A comparable program undertaken in the schools would also go far to develop a healthy well-nourished generation of Canadians.

The nutrition problem, we believe, extends beyond the field of public health in that it involves questions of major economic policy. Therefore, any nutrition program might profitably be integrated with the work of other government, *e.g.*, Agriculture, Fisheries, Trade and Commerce, National Defence and Finance.

Child and maternal welfare.—Development of facilities to investigate and report upon all matters pertaining to the welfare of children among all classes of the population and to render guidance and services on the basis of such investigation. Such a program would involve the study of infant and maternal mortality, accidents and diseases of children, child labour, etc., and should make provision for guidance to parents and services in the fields of pædiatrics, orthopædic surgery, dentistry, nutrition, psychiatry, etc. It is most important that expectant mothers be educated in and afforded adequate pre-natal and post-natal care, for which some form of registration of pregnancy would prove to be most advantageous.

Institutional treatment: sanatoria.—The provision of adequate institutional accommodation for the treatment of alcoholics and drug addicts. Though not strictly preventive, care of such persons has been long an accepted public health function. The cardinal aims of such a program would be to protect the community and rehabilitate persons suffering from these maladies, thus enabling them to resume their normal place in society.

Housing facilities. — The study by trained social workers of problems arising out of overcrowding and lack of proper housing in urban centres and appropriate action to remove such conditions. This question is, of course, a particularly pressing one at the present time because of the influx of war-workers into our large industrial cities.

Education.—An organized plan of lay education on disease and all other matters related to public health through publications, news releases, conferences, demonstrations, motion pictures, lectures, exhibits, etc.

It is appreciated that it is hardly feasible to organize and carry out the whole of such an ambitious program at one time, but emphasis is laid upon the need for formulating a program of this general character as a first objective. The various parts of a public health plan of this type could, of course, and probably should be placed in operation gradually.

It is our opinion that public health measures of the character under discussion should be coordinated but not consolidated with a health insurance plan. In other words, it is our view that the preventive and curative aspects of the whole question should be dealt with as distinct problems, administratively, although we, of course, recognize their close relationship in other respects since they complement each other.

Public health measures are frequently of a nature in which an entire community or a large group of persons are considered and benefited as a whole, while curative measures in event of disability usually concern a particular individual. These and other differences make clear to us that an attempt to administer the preventive and curative aspects in the manner prescribed in the draft plan will result in practical difficulties. Furthermore, if that were tried, one of them is almost sure to suffer at the expense of the other.

We believe that public health services essential for the public welfare should stand on their own and should not be contingent upon the adoption by a province of measures of any other kind, especially when there may not be

general agreement as to the extent to which such other measures are themselves properly subject to governmental operation. We therefore believe that Dominion grants to a province for public health purposes should be conditioned solely upon the need of the province for such assistance, and its proper use of the money for the purpose for which it is intended. In the not improbable event of a province which implemented the draft plan subsequently deciding to modify the insurance feature of its program, for example, because of its experience thereunder, not only would it be inequitable that its residents be required to forfeit their rights to the public health services being enjoyed by the residents of other provinces, but real difficulties and hardships would undoubtedly arise for many persons, and these would be highlighted by the contrast with neighbouring provinces.

For the above reasons, we are of the opinion that the Dominion by the payment of grants might encourage the provinces to adopt or enlarge public health programs, but that such programs should be independent of any action taken by the provinces with respect to the inauguration of a plan of health insurance. While every effort should be made to coordinate such program with any health insurance plan that may be adopted, the satisfactory operation of each would only be hampered by their formal union.

3. CONSTITUTIONAL AUTHORITY

Any memorandum of this character would be incomplete without some comment on the constitutional position of the Dominion in legislating on such matters. We believe that the Dominion Government has sufficient authority to deal with certain general matters of policy in the field of public health, and may make grants to those provinces which introduce measures of an approved type. We further believe that the Dominion should take the initiative in formulating broad questions of policy and, by the payment of grants to the provinces, should encourage them to embark upon a comprehensive program in the field of public health, conforming with such minimum standards as may be recommended by the Dominion and agreed to by the provinces.

An Australian Point of View

(We reprint the substance of the following address for various reasons; all of which come to much the same thing, that it is timely and readable. The author fully overcomes the admittedly heavy handicap of having to make a presidential address, and in addition to that accomplishment he deals with subjects now very familiar to us all. His approach and circumstances are just different enough from ours to be interesting in themselves, but his views on the future of medical practice in Australia could easily be applied to our own case.*

It will of course be realized that the profession in the Commonwealth of Australia is organized as Branches of the British Medical Association.

The subject headings are our own.)

Since the delivery of a presidential address is a rare and usually a unique occurrence in one's life, concerning which any previous experience is lacking, its preparation has seemed to me more difficult than that of purely technical papers.

In an address to a voluntary organization such as a Branch of the British Medical Association, the subjects to be covered would seem to be threefold: (*a*) by indicating the advantages of membership in the society, to attract nonmembers and to encourage waverers within its ranks; (*b*) to survey the activities of the past year; and (*c*) to forecast the shape of future events.

The President of the Branch must thus assume the triple rôle of propagandist, historian and prophet.

As our Association is the only organization that can claim to represent the medical profession in Australia, the chief guardian of professional standards, and an agency constantly working for the maintenance and improvement of conditions affecting every doctor, it might repay us to discuss briefly why our membership remains on a voluntary basis.

HISTORICAL

In the Memorandum of Association of all Australian Branches there is a clause transplanted from the Parent Association which reads as follows:

> Provided that the Association shall not support with its funds any object or endeavour to impose on or procure to be observed by its members or others any regulation, restriction or condition which if an object of the Association would make it a Trade Union.

What reason actuated the Parent Association in so forbidding actions which would make it a trades union is unknown to me. I have heard it described as an example of English snobbishness. And yet our Association has all the duties and responsibilities of a professional union; and there is much to be said in favour of its registration as a trades union, in the same way as the industrial unions are registered.

By bringing our organization into closer association with these bodies, it might well create a great accession of political power to our numerically weak body. At the same time the operation of the compulsory unionism clauses would throw on us the responsibility of accepting all registered practitioners within our ranks. Obviously the Branch Councils would

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* Being a Presidential Address by Alan E. Lee, delivered before the Queensland Branch of the British Medical Association.

From the *Medical Journal of Australia*, January 16, 1943, p. 45.

then have to accept many of the duties and some of the disciplinary powers now vested in the medical boards.

While such a move towards trades unionism should not be undertaken lightly, nevertheless, it is, I feel, a matter which merits very careful future consideration.

BENEFITS FROM MEMBERSHIP

But since we are still a voluntary organization, let us consider what benefits are associated with its membership. The Council of the Branch has been concerned recently about the little value some doctors seem to attach to their membership.

Amongst its members on active service there have been several examples in which doctors have elected to resign from the Branch rather than make an effort to pay the reduced subscriptions asked from them, and sometimes even rather than accept the means of continued membership which the Council is empowered to offer members in necessitous circumstances. Yet it is these members on active service who stand to gain most from the present and future activities of the Branch.

Amongst the swirling blasts of post-war reconstruction, they would indeed stand naked and alone, were it not for the protection afforded to them, members or non-members, by the massive influence of our Association. Even looking at the matter of membership from a purely financial viewpoint, the benevolence of members will continue to extend to those requiring monetary assistance, far greater aid than the moderate sum needed for membership.

Now let us return to the benefits of membership in such a professional association. Through the willing help of the librarian of the Royal Australasian College of Surgeons, I have obtained information concerning the aims and objects of some early Australian medical societies.

On July 20, 1858, in his inaugural address to the Medical Society of Geelong, the President spoke as follows:

> I trust that the establishment of this Society may be the harbinger of a better understanding between us, that in the search after knowledge, and the desire of imparting information to one another, the result of each other's reading and experience, those clouds of jealousy and distrust which have too long hovered above us, and obscured our better nature, may be dispersed.

The creation of a better understanding between medical men is still a basic reason for joining a society.

Isolated from each other in our daily work, as many of us must be, the common go-betweens fickle and unreliable patients, the development within the Association of bonds of comradeship becomes a paramount necessity. In this lack non-members of the British Medical Association suffer severely, while conversely the more closely members join in the work of the Branch, in council and committees, the greater grows their mutual understanding.

The published objects of another early Australian medical society so admirably express the advantages of a professional organization, that were there time an interesting hour might be spent in discussing how far, in the intervening seventy-five years, success has been attained in their fulfilment.

Formed on April 29, 1868, the Medico-Ethical Society had these following objects:

> The creation of a better understanding between members of the profession in their various relations with each other.
>
> The obtainment from the public of a more sufficient recognition of our position and services, and by consequence a more adequate remuneration for the latter.
>
> The determined resistance by us to the prevailing practice of public bodies, to consider medical appointments as necessarily honorary.
>
> The establishment, as far as possible, of an equitable scale of fees, both as a guide in private practice and in the case of medical witnesses.
>
> Resistance to the system of club-practice, as it now exists, and the substitution of some preferable mode of attending those persons whose circumstances do not enable them to pay the ordinary charges for medical attendance.
>
> The prevention of imposition on Medical Charities.
>
> Repression of irregular practice, by the systematic prosecution of offenders against the *Medical Act*.
>
> The establishment of a Court-Medical to which disputes between members of the profession may be submitted for arbitration.
>
> To define and to discountenance all unprofessional usages.

The Medico-Ethical Society is dead and gone, but its objects still survive in the activities of the British Medical Association. Success has been attained in some; in others, for example, such as fees for medical witnesses, negotiation is being conducted by your Council at this very time.

It will be noted that in 1868, and indeed for long after, the objects of a medical society were limited to establishing good relations between doctor and doctor, and between doctor and patient. The time was still distant when new doctrines of the duties of the State in regard to the health of the community were to face the practising profession with ominous signs of change in the control of practice and even in its very nature.

Today we are faced with the situation that the maintenance of health—of positive health as many of its protagonists insist on labelling it—is regarded as a vital function of the State. While already education and preventive medicine have become largely State responsibilities, Governments are becoming increasingly interested in the economic condition of the people, and in the standards of curative medicine, which form together the four-sided basis on which this edifice of positive health is to be created.

Though many have deplored the gulf which

is said to exist between preventive and curative medicine, Sir George Newman has stated truly that this latter practice, by postponing the event of death, is in the most real sense preventive medicine.

It is little to be wondered then that the standards of curative medicine should receive the critical scrutiny of the State; and it is for the British Medical Association members to see that their standards are maintained at so high a level that no revolutionary alternative to present practice can offer any hope of betterment. The technical and ethical standards of every individual member thus become of vital interest to our Association.

When the standard of practice of any doctor falls below the accepted level, he harms not only his patient and himself, but the cause of the whole organized profession, and *vice versa.*

It becomes then the duty of our society, by maintaining rigid ethical standards, and offering constant postgraduate instruction, to see that each doctor merits a place in the ranks of his learned profession.

BRANCH ACTIVITY

During the past year the Branch and its Council have carried on many of the activities already enumerated.

In the forefront of these must be placed its educational activities. The ever-growing advances in medical knowledge, the critical scrutiny of the State, and the prime necessity to maintain the professional standards of its members—all these render it essential that the Association shall not only offer, but demand of its members, their participation in postgraduate study.

Because the whole Branch has this common interest in the graduate activities of each of its members, it has seemed wise to the Council that a record of attendances at meetings of the Branch and of its Postgraduate Committee should be preserved; and the book which you are asked to sign this evening embodies this design. Though the more obvious purpose of this record is for the information of the Branch organization, it requires little imagination to envisage a time when the interest of State administrative officials in the standards of practising doctors may be sufficiently acute to make some of us grateful for this witness to a search after knowledge.

In spite of the constant overwork to which members have been subject, the usual programs of Branch meetings and of postgraduate courses and lectures have continued; and it is a matter of great pleasure to record the excellent attendances that have been forthcoming.

We have been honoured by the presence of many interstate visitors, spending the winter here for reasons less concerned with their own health and comfort than our own; while of great importance has been the educational liaison effected with many medical officers of the United States Army.

Isolated as we have been by distance and circumstances from more direct contact with overseas medical centres, the opportunity of instruction by, and discussions with, these professional cousins has been a pleasant hiatus within the grim structure of the war.

The administrative work of the Council has been concerned mainly with war emergency organization, and with matters concerning the Commonwealth Government.

The development of the Federal and State Medical Coordination Committees as a liaison between civil practice and its needs and the demands of the Army has been an event of considerable importance; and the great power of control over civil practice with which they are vested, though cheerfully borne today because of the urgency of the situation, is still a valuable testing ground of the reactions of members to some of the mooted compulsory medical schemes of the future.

In the immediate future a confident call is being made upon the further benevolence of members. Since the outbreak of war, when doctors in private practice enlisted for active service, their patients must of necessity be cared for by the remaining civil practitioners.

After dealing with strictly domestic details, Dr. Lee continues:

Signs multiply on every hand that in this building of the post-war world the reorganization of health activities is to occupy a foremost place. If when this comes, and none of us knows how soon that may be, we are not to find ourselves dwellers in a strange and alien home, it behoves us now to work on our plans and offer what help we may to the architects of reconstruction.

THE FUTURE OF MEDICAL PRACTICE

The present organization of medical practice is like a solid but somewhat old-fashioned home. There must be some modernization. Is it to be brought about by a little pulling down and some reconstruction of the old building, or is the whole structure to be pulled down and built afresh? Though all such up-rootings have their discomforts, there might be much to say for this latter view, if it could be built to our own plans. But just because we are not sure the architects will even consult us, many of us think we would be wiser to stick to our old home, and modernize it speedily, and with care and skill.

It is of paramount necessity that every doctor should understand the various plans that are being proposed for the future nature of medical practice. Much of this planning has been formulated by members of our Branch, and during the early part of the year, three con-

secutive general meetings were devoted to the discussion of schemes advocated respectively by Sir Raphael Cilento, by Dr. T. A. Price and by myself.

But even amongst the medical profession there can be no possible unanimity on what system will best preserve the public health. Habits of mind, the effect of environment, political views, and degrees of attachment to present circumstances—all these colour and condition one's hopes for the future. It is nevertheless true that the foundation of any medical service, private or public, must be the medical practitioner. He is its anchor, its pivot, its instrument; and a service which fails to receive his goodwill must fail.

Though the approval of the medical profession is essential for the success of any plan for the reconstruction of health services, it is very doubtful whether the organized profession should itself sponsor any new plan before the jury of the people. By so doing it enters the lists as a propagandist, and surely weakens its position as the ultimate judge of what shall be accepted or rejected.

Rather I believe the attitude of the British Medical Association should be this: we uphold a system of medical care which has gradually evolved by the best of all methods, that of trial and experiment, which debars no one from adequate care, which is efficient and is still evolving along lines about which there is fairly general agreement towards ever more effective service.

We will study any new plans with the greatest of care; but we propose to continue with the present basis of practice, irrespective of political or other arguments, until we are convinced that some other system can better preserve the health of the people.

While schemes for reconstruction should not be sponsored by the British Medical Association, it is for individuals and groups within the profession to produce the ideas and the plans which ferment evolution.

Though members may advocate any proposals they choose, it is well to remember that it is only on the technical side of medical care that such expert knowledge is usually available as will give their plans special claims to consideration.

Especially I believe they should avoid too much pre-occupation with the financial side of medical care. This can never be a dominant factor in determining the nature of future practice.

With the present structure of practice no person is debarred from obtaining adequate medical attention because of a financial barrier. If health cannot be preserved on a fee-for-service basis, some method of concessional care is readily available. And even were such concessional services less readily available, there is in Australia a vast financial reserve that might better be diverted towards health preservation than as at present towards its dissipation.

When one considers that expenditure on health services for all Australia needs perhaps £15,000,000 *per annum*, while the expenditure on alcohol in 1940-1941 was £42,000,000 and tobacco £25,000,000, and that perhaps £40,000,000 per year is spent in betting, too much emphasis on the cost of health services appears farcical.

Concerning the political aspects of health services, our small numbers make us impotent. One need be less than a prophet, however, to see that the political bias of the present Federal Government is towards the adoption of a nationalized salaried service.

Because it is available to them, fortified by masses of detail, however inaccurate, the scheme of the National Health and Medical Research Council will form the basis of any service they may try to introduce. It is quite unpardonable that any member should fail to study this document.

Provided the profession presents a solid front, we may say of the attitude of the Federal Government to this scheme, without irreverence, that the Government proposes, but the medical profession disposes.

And with this thought I will conclude this address. There was never a time when our profession so needed to know its own mind, that it might present an unbroken front to whatever menaces its safety, and the care of the health of the people. But, granted this solidarity, with constant vigilance, keeping our powder dry, we need have no fears for our future welfare.

VITAM QUÆ FACIUNT BEATIOREM

Since, dearest friend, 'tis your desire to see
A true receipt of happiness from me;
These are two chief ingredients, if not all:
Take an estate neither too great nor small,
Which *quantum sufficit* the doctors call:
Let this estate from parents' care descend:
The getting of it too much of life does spend.
Take such a ground, where gratitude may be
A fair encouragement for Industry.

—Martial: Lib. 10, Ep. 47.

Men and Books

TYPHOID FEVER FROM THE INSIDE

By A. H. Gordon, M.D.C.M., D.C.L., LL.D., F.R.C.P.(C)

Montreal

[*This address was given before the McGill Undergraduate Medical Society during the Session, 1922-1923.*

As a personal experience it obviously belongs to a definite period, but in its shrewd clinical comment it has the permanence of wisdom.—Editor.]

During the holidays I read a story called "The Floor of Heaven", a story of the hunting field, where a pack of hounds followed by men and women on horseback chased a worried and harassed fox over miles of country until they cornered him and wound up his mundane career.

The delights of the chase, the gallop over fields and the clearing of fences, the bright sunshine and the clear air, the keeping up with the hounds and being in at the death gave a thrill to the hunters and made a very pretty story, but what of the fox? Could he have dictated an account of his sensations as he sped and doubled and sped again, using all the wits that nature had given him in a brave attempt to escape from baying beasts on foot and halloaing ones on the backs of horses; could he have told of the tiring of his legs and the losing of his wind, of his fear of the hounds behind, and his hopes of shaking them off, of the gradual nearing of his foes in spite of his best efforts, and of his growing fear of the inevitable, could he have broadcast all this leap by leap and step by step, the story would have had little likeness to "The Floor of Heaven."

Most of us here are familiar with Osler's "Principles and Practice of Medicine", some of us not as familiar as we might be or hope to be, but all, I think, will remember that the volume opens at the subject of "Typhoid Fever", and proceeds in an inimitable fashion to give the history, pathology, diagnosis, prognosis and treatment of what was for years the commonest medical disease in Montreal hospitals. After twenty odd years of seeing the suffering caused by this disease, and the havoc wrought by it as shown post mortem, together with my reading from time to time those first pages of Osler and other pearls of wisdom dropped here and there in the literature, I felt a certain degree of familiarity with the ways and works of typhoid fever.

In other words "typhoid hunting" like fox hunting had become an agreeable occupation, fit to occupy the time and attention of a gentleman; and watching the disease run its course as the fox ran his, whilst keeping open one's eyes and ears and other senses for its sidewise jumps or backward doublings, which every case would sooner or later show, made the pursuit of the disease anything but monotonous. So much for the side of the game as it appears to the hounds. Now for the way it looks to the fox.

The late Professor Wesley Mills in whose department of Physiology at McGill I worked for some years, used to say that no man had completed his medical course until he had taken an anæsthetic and had a stomach tube passed upon him. I think I might add, until he had had typhoid fever.

This last portion of a postgraduate course in medicine I had the opportunity of taking just after lectures closed last spring. I had planned another postgraduate course of another sort in another place, but had to accept what came, and that leads up to the story of typhoid from the standpoint of the fox.

Nowhere perhaps is the difference between the objective and the subjective better illustrated than in a doctor's attitude toward the same illness as it occurs in another person and as it affects himself. A certain group of symptoms and physical signs automatically suggests a title when it occurs in a patient, but for the same symptoms and signs in oneself the avenues of perception are entirely different. Instead of reaching one by the way of touch, sight and hearing, the impressions come chiefly through the general sensations and especially through the sensation of pain. Physical signs cannot be realized in most instances. And, to cap all, in the words of Burns, "When self the wavering balance shakes, it's rarely recht adjusted." Particularly is there a predisposition to classify one's sensations under the headings of simple or familiar combinations.

THE "CASE REPORT"

For a week in the early part of May I was conscious of an unusual fatigue of which I spoke several times to my house physician while making ward rounds, but fatigue in the spring is not unknown, and I paid little attention to it, though I would bring a chair to the bed of each patient I examined. There was no loss of appetite and no other discomfort until the end of that week. Having done my day's work and feeling some headache which I attributed to a recurrence of an old sinusitis, I thought a day in bed would help it as usual, and stayed in bed over Sunday, and, I think to salve my conscience for not working, took my temperature, and was rather proud to find it 101°, which allowed one to rest in comfort and refuse calls on the telephone, with a good appetite and a very little headache. I was rather surprised that the temperature in the evening was 102° which gave me good reason for extending my rest over Monday. Life was not quite so happy on that day, and I sent back

some of the things on my tray, quite contrary to habit, and visitors were not very welcome. When the temperature reached 103° that evening I felt that a further investigation of the offending sinuses was advisable, and I went into hospital, ostensibly for x-rays and special examination, but at the same time inviting the professor of medicine to visit me next morning.

As a matter of precaution in view of the curious way the temperature had acted, I suggested to the house officer who had me in charge the taking of some blood for a Widal test and for a culture. This however was not that I particularly feared typhoid, but to carry out the routine in any case with fever.

To settle the matter I may say that the blood culture was positive and the special examination showed no reason in the sinuses for a headache, and thus I was properly launched into a *bona fide* attack of typhoid fever, and ceased from then to exercise any control over my own activities, so I may freely describe the further happenings from the standpoint of the victim.

Things began to happen quite rapidly, once I settled down as a patient, and the first, last and only thing that stands out in those first days is the headache. We have been taught that headache is a symptom of typhoid, and in the past I had thought of it as one of the things to be ordinarily expected, which reminds me of the statement of La Rochefoucauld, "We have all sufficient strength to endure the misfortunes of others", for I had before endured the headaches of my patients with great equanimity. Not so now. I will always remember the gasp of relief with which I grasped at the ice bag which the nurse gave me, and how I kept it applied with both hands in all the places it would touch my cranium. Even then there was an underlying misery which coloured all other sensations and which stands out as the one memorable event in the first nine days. The textbooks mention that headache occurs during the first week—there's not a doubt about it! But when the eighth and ninth day came and it still was there, I was conscious of a grievance and rather wondered why those about me did not take this fault in the schedule as seriously as I did. As I recall it, there was no waking hour in which I did not suffer from that headache, and it seemed to be the chief reason why sleep was such a broken and unsatisfactory affair.

There were two other sensations in those first days; one was fatigue and the other was a dry mouth.

Lassitude is spoken of as characteristic of typhoid, but again, lassitude in someone else sounds a rather trivial matter. But this thing was far from trivial. It invaded and pervaded all one's consciousness and rendered every attention an intolerable bore. The effort of turning over in bed took on the proportions of a trip to Europe, and visitors, even one's nearest friends, were nothing short of a calamity, and there was constantly the feeling that if the bed were ten feet lower it would be a pleasure to sink down to it.

In addition to the fatigue there was also a constant sense of bodily soreness, but this was mild in comparison.

When I think of the dry tongue I have a memory of hating to wake up to return to the sensation of a rasp of a tongue grating against a wooden roof to my mouth. The effort to move it around was as unpleasant as reviving a limb which had gone to sleep; and the taste—it reminds me of the coloured man who was sleeping when a practical joker dropped quinine on his outstretched tongue. When he awoke his distress was profound. He felt "pow'ful" sick, and, when asked what was the matter, he " 'lowed he had busted his gall".

One other discomfort that stands out is the intense dislike for sweets. I was fed every two hours on the elements of a high calorie diet, and time never seemed so short as it was between those feedings; milk and cream, eggnogg, barley water and lactose with lemon, ice cream, milk, soup and orangeade. Just why this disgust for sweets appeared I do not know, but it continued long into convalescence and even yet oversweetness is most unpleasant.

These are the outstanding memories of those first weeks; all else is a swirl. There was no distinction between days and nights and there was this degree of amnesia that from memory alone I could not say how long the period lasted. It was however, punctuated by certain events, and whether they came at the earlier or the latter part of the period of vagueness I cannot say. One was in what would I suppose be called a dream, but never before or since did I suffer such mental torture.

I remember my wife coming and telling me of a terrible catastrophe which had befallen one of my children and as evening wore on, I recalled that one of my colleagues in the hospital had come in and confirmed this, pointing out as evidence a chalk mark on the floor of the room across the corridor, the exact shape and dimensions of the body of my child. All that night I did not sleep a wink. I tried to doubt the truth of the tragedy, but here was the incontrovertible evidence from three sources, my wife's statement, my friend's statement and the unanswerable diagram in chalk upon the floor. As to all other matters I could reason quite clearly. The next morning when the nurse had gone out, I asked my wife to go over again the details of what she had told me the day before, and to my amazement and unspeakable relief, she said she had told me nothing at all, that my family were all in perfect health and no accident had happened to them. "But what about Dr. L's statement?" "Dr. L. has not seen you at all, and the room opposite is occupied and there are no marks on the floor." Going from purgatory to paradise could not possibly be greater

happiness than that which came to me from this assurance.

One other story of this period. Each night after the nurse had gone through the routine of sponging, rubbing, changing ice bags, giving drinks and generally arranging things for the night, I settled down for sleep, but always changed my identity and became a young Jewish business man, always well groomed and of gentlemanly demeanour, but each night of different appearance from the night before. Usually dark and rather short and thick-set and always clean shaven, he got on board a Pullman car bound for New York, and the train always started from the lower righthand corner of the wall opposite me and travelled diagonally upwards and to the left, but never in those days do I remember that it ever reached the upper left corner. This was not a delirium but a regularly recurring dream, and I would always joke with the nurse in the morning about the sort of a man I had turned into the night before.

These things were all so clearly defined and reasonable that I was patting myself on the back for not going off my head, but it made me sit up a little when, reading my chart a long time later, I saw written here and there in the nurse's notes, "was slightly irrational."

These were the days of regularly recurring ice-spongings and they served the purpose of marking the time. I do not recall that I disliked them especially. I remember often being thankful they were not the ice-tubs we formerly gave typhoids, but when first I had a tepid sponging instead, I confess I did not want to return to the cold ones.

I remember in a school book seeing the definition of an "epoch" as a "fixed point of time," and such an epoch appeared after midnight one night in about the fourth week of my illness. I had been a little hoarse for a day or two, then developed a loose cough with some easily expectorated sputum. When I woke on this night I felt as if I had bruised my right side and found that a deep breath or a cough was very painful, and, being human, that made me want to cough some more, just to see if it would hurt: like a picture I saw years ago of a big Irishman with an upraised shillelagh over the head of a small Scotchman working hard at his pipes. The Irishman is saying "Play 'The Boyne Water', Sandy, just to see could I stand it." I turned over on my left side and stayed there so consistently for four or five days that I developed a complete loss of sensation over the outer left thigh. It is a common tradition that a patient with pneumonia or pleurisy always lies on the affected side. He may, but all the traditions I ever heard would not have persuaded me to do so.

This event, which was an intercurrent pneumonia with its associated pain and shortness of breath was without doubt most distressing. Badly as I felt used by the primary headache, I would have exchanged any day my new chest for the old head. I was much relieved by a hypodermic injection of morphia, but a recurrence of the pain called for a second dose of morphia and the results of this were far from pleasant—nausea, vomiting and very marked distension which made me feel of all men most miserable and extremely sorry for myself, and thereafter I think I would have put up with any physical pain rather than another dose of morphia.

In the course of time the severer part of the pain died away, but before it went I had another useful but unwelcome demonstration. Whether from a diaphragmatic pleurisy or not, a very persistent spasm like hiccups came on the scene, and as each jerk was attended by a good deal of pain and cough, these were very annoying, and I was hard put to it to get relief, as morphia seemed the greater of the two evils. I got the notion that if I could keep my mind fixed on some other subject I might force the hiccups into subjection. I therefore called to memory all the verses I had ever learned and recited them steadily for a whole evening—nursery rhymes, hymns, *Tam O'Shanter*, *The Burial of Montrose*, *Edinburgh after Flodden*, *The Island of the Scots*, *The Wreck of the Hesperus*, *The Lady of the Lake*, each one with missing lines or whole verses gone, but since there was no audience but the opposite wall that was a small matter. The effort was one at which Mr. Coué would have smiled approval, but had there been other listeners they would have smiled also at something like the following: "From the fields 'hick' of wild 'hick' Breadalbane, not a 'hick' 'hick' man who heard him speak would that 'hick' day have 'hick' left the battle. Burning 'hick' eye and flushing cheek told the 'hick' Clansmen's fierce 'hick' emotion, etc." But there was an end even to the hiccups. They "jes natchelly" stopped, but with their cessation a new act came on the boards.

Without any very good reason I began to sweat. Not the manly sweat that bedews the brow of honest labour, but more like that which made one feel in the words of Mr. Mantalini "a dem'd damp disagreeable body." During waking hours these sweats were not evident, but let one drop off to sleep for ever so short a time and he would wake a dripping rag. To have all one's intimate garments soaked three times in one night came to have the dimensions of a grievance; and in addition, at this period a rather thinly spread cheerfulness over an appearance of concern seemed to appear on the faces of those about me. I later discovered that at this time the temperature took funny drops from 103° to 97° and no good reason appeared for it. These sweats, like the other ill-considered trifles of an illness, were, next to the headache and the pain my most disagreeable sensations.

After these sweats passed away I began to feel very comfortable except for a laryngitis for which the hardship of a solitary confinement

and a whispering gallery were prescribed, then a long and to me unexplainable period of recumbency ensued, and until I was up and about I never knew that I had passed through a moderate relapse without knowing or even suspecting it. I had been told two weeks before that the temperature had touched normal, and daily during a fortnight that it was satisfactorily falling, so I mentioned that by that time it must be in the sub-basement, but this did not draw even a comment from my incomparable nurse.

Finally I learned the lesson that the way to get things was not to ask for them, and one day to my great joy I was given a backrest and a tray and some real food, and from that on pleasure grew from more to more. Then there came books, then a chair and a razor and my own clothes, a real bath in a tub, and a walk in the corridor, and, at the end of two months, home.

What profit may be extracted from an affair which kept one in bed for eight weeks and away from his lawful occasions for two months more? Any profit that there was would appear to be more of the mind or of the spirit than of the body or the estate, though as concerns the latter, there was an unquestioned advantage in that my next income tax would be materially scaled down. To the man however, who attempts to practise medicine there is a distinct benefit in acquiring the sick man's point of view, and there is no way by which to get the real local colour of the sick man except to be one. The Wild West stories that are written in Jersey City, to say the least, do not carry conviction, and similarly one does not look for an intuition of what a sick person is thinking of, from one who never met fatigue or pain or sleeplessness except in the pages of a book on Diagnosis. I once heard it said of a very robust surgical acquaintance, that he would be much more successful if a patient's complaints meant anything to him. Not that he was heartless, for he wasn't, neither was he deaf, but he did not understand Chinese. This means that he did not know the language of physical pain or discomfort, and thus a wide avenue of medical knowledge was closed to him. For that reason when a person says now he has a headache, that does not only mean to me Symptom No. 1 of typhoid fever. It means an infernally bad feeling inside his cranium which he would very much like to be rid of, and when he sweats,—no, not "perspires"—*sweats*—it is not only that this is the sudoral type of the disease, but that he has a cold, slithery, slimy feeling, and would like his shirt changed, thank you!

Another aspect of this question is the change in the relative importance of things that sickness brings about. To most medical men and those to be of the number, the *diagnosis* of disease is the chief end of the effort. To the sick man, the diagnosis has only one importance, and that is whether by it you can tell if he is going to get well, and if so when? That he has the finest rose spots and the biggest spleen, or the most perfect agglutination raises but little enthusiasm in him. But interest yourself in his backache or bellyache or headache and he is with you to the end of the chapter. There is no doubt but that the interests of sick people become narrow and selfish and petty and concentrated largely upon their illnesses. Why is this?

Those who drive cars during this season in this latitude will scarcely escape the adventure of getting stuck in the snow at the side of the road. You are hurrying to an appointment and this very trivial and ordinary event brings you up short. Is it funny that you, an educated and cultured person, should discuss your predicament with a carter or a corner loafer, or that you would from an utter stranger borrow a broken and ridiculous shovel to dig yourself out? Or that you twist and strain your engine and your steering gear in ineffectual efforts to get again on to the road to that appointment that is even now overdue? And can anyone blame you for having a narrow and selfish and petty interest in that snow bank that holds you up, instead of taking comfort out of the setting sun or the ease with which other travellers pass along the beaten track?

Yes, the sick man whose lawful errands have been interrupted by the snow bank of sickness will try any means, wise or unwise, dignified or undignified, which will put him again upon his way, and it is hard to censure the sick person for a concentration of his mind upon one subject when that is the one obstacle between him and his object in life.

Time and again in the years gone by when I have attempted to be very cheerful with a patient in the pains of labour, have I been brought up short by her apt remark, "If you were having this baby you wouldn't feel so cheerful over it!" It may be difficult to acquire that viewpoint, but the principle holds.

Any illness brings home to us a matter often forgotten among doctors, and that is the prime importance of environment to the sick man. I mean walls, curtains, flowers, quietness; yes, all these somewhat, but more than all, human contact. The well man may provide his own environment, and if he does not like his surroundings he can leave them—"If he knows a better 'ole he can go to it", but the sick man is dependent upon what comes to him.

This is a rather stunning notion for those of us who by calling and opportunity are picked as a large portion of the human environment of sick people. We have no right to take wrangling nor dirty hands nor bad manners to the dinner table, neither have we a right to take any of these, nor doubts, nor pessimisms, into the sick room. Here we cannot refrain from emphasizing again that quality of "equanimity" in the physician which Osler immortalized. Until I was ill this idea never attained its real value

with me, but when I look back and recall people about me who radiated serenity, and, though gravely anxious, never showed by the raising of an eyelash that things were not going well, I take off my hat in profound respect, and some of these were women.

"Now and not hereafter, while the breath is in our nostrils,
Now and not hereafter ere the meaner years go by,
Let us now remember many honourable women
Such as bade us turn again when we were like to die."

It would ill become me to rhapsodize over such a very ordinary matter as a doctor's visit, that kind of a visit which costs anywhere from 50c up, depending on what the traffic will bear. (This does not refer to surgical visits, which, I believe, have no upper limit financially!) You may look at it as ordinary when you are well, but when you are sick, the doctor's visit is the one big thing in the day. Everything today starts from it and everything tomorrow works up to it. And it has a halo about it to the sick man which makes it almost sacred. Even my revered friend the Professor of Medicine, Dr. F. G. Finley, took on an added greatness when he came in the capacity of doctor to the sick man.

All this brings seriously to one's attention the gravity with which the doctor's words and the words he does not say, his frowns, his smiles or even his jokes may be taken by one who lies in the bed. Be careful as one may, even one's looks will sometimes be misunderstood. So if it is possible to extract any legitimate crumb of comfort from the circumstances, it is only fair to leave it for the sick man to nibble on till you come back tomorrow.

"When breakfast's o'er, my bath is done,
My room is neat to see,
The event of the day takes place,
My doctor visits me.

I have a host of aches and pains
But I forget them all,
Unless as happened one dark day
He doesn't make his call."

Now I have wandered far from typhoid and must wander back again. What can one learn from typhoid by having it? First, he can very well learn to advise other people not to get it. Having had a horse stolen through carelessness I would advise you to lock your stables. From 1915 onward I neglected re-vaccination because I was too busy, and I had more than four months' rest to remember it by.

The War experience with typhoid should not be lost during peace, and vaccination of the whole population is an ideal condition. My first act after I knew I had it, was to have my family all inoculated. Second, one is impressed by the loss of memory associated with the disease. Except for a few high lights which I have noted, the febrile portion of the disease seems to have shrunken into very small compass—a toxic effect comparable to that of hyoscine in twilight sleep, and a very merciful arrangement.

I am impressed by the complete absence of any fear of danger, for though fairly grounded in all the possible serious complications of the disease none of these ever seemed to me even distant possibilities. Even when spongings were given I never thought of the fever having gone beyond the 102.2° mark, in other words there was a childlike optimism about my own case—I suppose another toxic effect. It now seems almost ludicrous. What is a real joke is that I went through a two weeks' relapse without a symptom, and never suspected that the temperature was above 99°, whereas it reached a daily mark of 102°-103.°

Convalescence I watched with keen interest and the slow return of strength was a daily source of astonishment. Here perhaps my experience has been of real benefit to future patients. Recovery of strength is a slow process and one cannot for weeks burn up extravagantly his body tissues and find his balance on the right side still. Time and time only can restore—a fire loss is made good only by building. Convalescence is a poorly understood and poorly practised part of medicine by both physicians and surgeons. It is irrational to send a patient back to work until he is at least as well as before his illness.

The slowness of recovery in some mental processes was very noticeable. Previous to being ill I had a fair memory for proper names, but for some months later names came very slowly and some I could not recollect at all. On the other hand the long rest allowed me to read with avidity and absorb with satisfaction almost anything I fancied, but mental fatigue was easily induced.

I learned what an inestimable boon to the sick man is skilled nursing. The change from positive discomfort to comfort brought about by a skilfully given sponging is almost past belief. I learned also that the effort to feed one for his needs and not for his wishes represented in a high calorie diet greatly shortens one's disability.

Many other minor matters are clearer to me from viewing typhoid from the inside, but if you ask if I would like to repeat the experience I can only reply as did the man who was asked how he liked having twins in the house. He said, "I wouldn't sell those boys for a million dollars, but I wouldn't give five cents for another pair."

BANTING AS AN ARTIST*

By H. E. MacDermot, M.D., F.R.C.P.(C)

Some day probably we shall have a biography of Sir Frederick Banting. When that comes to pass (and one may hope that it will not be too soon) it will be found that at least

* Banting as an Artist. A. Y. Jackson. 37 pp., illust. $1.00. Ryerson Press, Toronto, 1943.

one chapter has already been written in Mr. A. Y. Jackson's "Banting as an Artist". It is very short, but Mr. Jackson has managed in its small compass of words to do just what he has always been so infinitely capable of doing with his brush—he has produced a picture. If the biographer-to-be is wise he will take it just as it is, and be thankful.

It is hard to say wherein the charm of this bit of writing lies, though perhaps not any more difficult than is usually the case in tracing charm to its source. It has at least, however, complete freedom from any attempt at effect; it is perfectly simple and direct. That is much.

There is in it an underlying tone of austerity, of rigorous conditions of work, along with the tranquillity of untouched country life. One feels something of the fascination of the villages of Quebec, just as Banting felt it. Here is an extract from his diary while he was at Ste. Fidèle on the North Shore:

> "I hate to leave this country. There are so many fine things about the people. Life is less complicated. They have simple faith, large families, little of this world's goods and much happiness. They work long hours and steadily, but not too hard. They are never in a hurry."

Banting moved in it as naturally as a Canadian would, loving it and painting it with almost incredible success.

But after all, the charm must lie mainly in the quality of Banting's mind, his wholesomeness, his eagerness, his honesty. He knew he wasn't a painter.

> "The pleasure," as Mr. Jackson says, "was in making them (his paintings), in mixing up a lot of colours in a sketch box and all the adventures that led up to it, the freedom from responsibility, scrambling over unknown country, getting burned by the March sun, smoking a pipe before the camp-fire, or the welcome at the little hotel and the good meals and the looking over the day's work."

It is a side of his nature which it is very pleasant to be shown by so kindly and so wise a guide as his friend Mr. A. Y. Jackson.

CATECHISM IN MEDICAL HISTORY

By Heber C. Jamieson, M.B., F.R.C.P.(C)

Edmonton

QUESTIONS

1. What is the derivation of the word "febrifuge"?
2. The artists of what country were specially fond of painting medical scenes in the seventeenth century?
3. What substances appearing in the London Pharmacopœia of 1677 were discarded and have now returned in new form?
4. At the commencement of the Revolutionary War there was only one medical book written by an American, Dr. John Jones. What change in professional dress was he responsible for?
5. Molière satirized the physician in the drama; Butler, in verse. What writer of antiquity, but whose works are well-known today, neatly accomplished this in prose?
6. Did anyone ever suggest giving a prescription for music instead of drugs?
7. What part did beer and ale play in hospital practice during the last two centuries?

ANSWERS

1. In ancient Rome sufferers from fever worshipped at the shrines of Febris, the goddess of Fever. To such temples they brought their amulets and charms as offerings. These were called "febrifuges" from the Latin words for "fever" and "to put to flight". At a later date the term was applied to vegetable and mineral remedies.
2. Holland. Anatomical scenes were favourites of the Dutch painters. The Urine Casters were frequently depicted also. *The Anatomy Lesson* is one of the most famous.
3. Human placenta, urine and the sexual organs of several animals. Some others are still in the discard—excreta of animals, cast off snake skins, ground wood lice and ground mummy.
4. He did away with the wearing of wigs and the carrying of canes. His colleagues swore they would not consult with him, but his reputation as a surgeon was too much for them, and under protest they met him and soon the wigs disappeared.
5. Æsop in "The Incompetent Physician".

   "Once upon a time there was a doctor who did not know his business. He went to visit a patient who had been told by other physicians that he was in no danger, although he might never get entirely well. This doctor, however, told him to set his worldly affairs in order, 'For', he said, 'you won't live for more than a day longer'. With these words he departed. A short time afterwards, the patient got up and went out for a walk, dragging himself along with difficulty and looking rather pale. The doctor met him, looked at him and said, 'Good morning. How are the gods in the Land of the Dead getting on?' The patient answered, 'They have settled down. They are drinking the waters of Lethe. But a little while ago, the two gods Death and Hades were terribly excited. They were threatening to do all sorts of terrible things to the doctors on earth because the doctors knew so much that they kept men from dying. And so these gods started to write the names of all the doctors. They had actually written down your name on the list. But I went up to them and told them that they were mistaken. 'This man', said I, 'pointing to your name on the list, has been falsely accused. He is not a physician at all'."

6. Yes. Dr. Robert Schauffler, an American, compiled a musical pharmacopœia. For nervous exhaustion he prescribed several songs of Grieg. Some of Bach's work were indicated in cases of mental somnolence following excess of alcohol.
7. Beer and ale were used for centuries in medicine either alone or mixed with curative drugs. In 1770 at the Radcliffe Infirmary a small brew house was erected where the porter brewed small beer for the patients and ale for the staff. Strong beer, not brewed in the house, was also used for making poultices. "Any strong beer that is not fit for drinking will be an agreeable present for the use of the surgeons." Until about seventy years ago the nurses were allotted one pint of beer a day but the doctor in charge of a very trying case was permitted to prescribe for the nurse on duty "that ration of whatever quality of beer or porter he may judge to be expedient to be issued to such a nurse".

Medical War Relief Fund

The Second Year's Work

[*The following review of the British War Relief Fund (Brit. M. J., Jan. 23, 1943) will, we are sure, be of interest to our readers. It will be seen that the Fund is steadily providing much needed assistance.*—ED.]

The Medical War Relief Fund was established in September, 1940, for the assistance of British medical practitioners and their dependants who are temporarily in financial straits as a direct result of war conditions. Although the greater part of the sum subscribed remains unspent, the committee hopes that the steady flow of subscriptions will continue, for it must be anticipated that the demands on the Fund will increase as the offensive phase of the war develops. Cheques, payable to the Medical War Relief Fund, should be sent to the Honorary Treasurer of the Fund at B.M.A. House, Tavistock Square, London, W.C.1.

Generous Contributions

The Committee of the Fund wishes to express sincere thanks for the continued support of many generous donors—individual medical practitioners and groups of practitioners, local units of the British Medical Association, both at home and throughout the Empire, Local Medical and Panel Committees, and other medical societies and institutions. Subscriptions have come from doctors in every continent, from doctors confined in enemy prison camps, from doctors serving in His Majesty's ships on the high seas. The committee would refer in particular to the most generous help given by Australia and Canada, notwithstanding their own difficulties and anxieties. A final contribution from the profession in Australia brings the amount received through the Australian Federal Council of the B.M.A. to the magnificent total of approximately £A.4,500, while during the period under review nearly £1,400 has been transmitted from Canada through the Canadian Medical Association. Contributions have come from outside the Empire and from outside the medical profession. Grateful acknowledgment is made of a donation of £265 from the North Pacific Society of Internal Medicine, Seattle, and a donation of £250 from the Mufulira War Funds Committee, Northern Rhodesia.

Awards to Applicants

The amount distributed is somewhat less than during the first year, the decrease being attributable to the diminution in the number and severity of the air attacks on the home front. Twenty-eight applicants received gifts, six were given loans, and in two cases both gifts and loans were awarded. The gifts vary in amount between £550 and £30, four exceeding £250 and thirteen exceeding £100. The highest amount granted as a loan is £220 and the lowest £22. The awards made between the date of the inauguration of the Fund and August 31, 1942, amount to £13,029, the gifts totalling £8,967 and the loans £4,062, and the number of beneficiaries being seventy-three.

Illustrative Cases

The following brief summaries illustrate the variety of the circumstances which have resulted in appeals for assistance during the year.

Dr. N. had served at sea as a medical officer in the R.N.V.R. and had lost valuable medical equipment when his ship was bombed. On being invalided out of the Service he required help to re-establish himself in his considerably reduced practice, and he received a suitable gift for this purpose. Later he applied for, and was granted, a loan for the purchase of new apparatus.

Dr. O., a comparatively young widower, was killed during an air raid while on duty at a first-aid post, leaving two orphan children. His small practice realized a very modest sum. The children are being cared for by relatives whose income, supplemented by the small Government pension, is insufficient to provide suitably for their maintenance and education. The necessary help has been given in the form of a gift, payable in instalments over a period of years.

Dr. P. was a victim of a double raid on a cathedral city. The first raid ruined his house and the second destroyed his surgery and all its contents. He obtained other accommodation but needed assistance to enable him to pay for repairs, furniture, instruments, and drugs. The required amount was provided as a gift.

Mrs. Q. sailed under Japanese bombs from Singapore, where her husband was in civil practice. She had decided to remain with him, but was ordered to leave and could take few possessions with her. On arrival in England she

lost no time in securing employment, but she was in need of a small loan, which was readily granted.

Mrs. R.'s husband held a public medical appointment in the Far East. When he retired on pension he did not return home but joined the R.A.M.C. in Malaya, where he was reported missing. Mrs. R. has obtained work that enables her to support herself, but the educational expenses of her son presented a problem which has been solved by a gift from the Fund.

Mrs. S. is unable to take up remunerative employment as she has a young child under her care. When her husband was killed while serving in the R.A.F. she was in no immediate difficulty apart from certain debts, only some of which were covered by a grant from the R.A.F. Benevolent Fund. The additional sum required was provided in the form of a gift.

The following additional subscriptions have been received:

Oxford County Medical Association, Ontario.... $99.60
Individual subscriptions from Saskatchewan..... 35.00

Contributions to this Fund from Canada as on March 15, 1943, amount to a total of $8,817.43.

Medical Societies

La société médicale des hôpitaux universitaires de Québec

Une séance a eut lieu à l'Hôpitaux Universitaires de Québec le 5 février 1943. Suivent les résumés des travaux présentées.

CALCIFICATIONS INTRA-CRÂNIENNES.—L. LaRue, M. Samson et L. Patry.

Il s'agit de calcifications intra-crâniennes consécutives à un hématôme sous-dural, résultat d'un traumatisme crânien survenu à l'âge de douze ans, chez une personne actuellement âgée de trente ans. Au moment de son accident, cette personne n'a présenté que des légers étourdissements qui n'ont duré que quelques jours. Ce n'est que cinq à six ans après qu'elle a commencé à accuser des maux de tête qui ne l'ont pas empêchée de poursuivre ses études et d'être affectée plus tard à l'enseignement. Ces dernières années, les maux de tête ont augmenté, des troubles du sommeil sont apparus et sont demeurés inaccessibles à toute thérapeutique. En outre, cette personne a présenté des pertes de conscience à deux reprises depuis deux ans, à la suite desquelles elle avait fait des troubles mentaux de courte durée. Récemment, les troubles mentaux se sont manifestés de nouveau et ont necessité l'hospitalisation de cette malade. Celle-ci ne présentait aucun symptôme neurologique de localisation. Le LC.R. à part une légère hypertension était normal. Par contre, les radiographies du crâne nous font voir de nombreuses calcifications intéressant les régions fronto-pariétales gauches. Nous attribuons l'existence de ces calcifications à la formation d'une hématôme sous-dural qui résultait du traumatisme crânien qu'elle a subi. A la suite da la ponction lombaire, les troubles mentaux sont disparus, et nous avons conseillé à cette malade de se diriger vers un service de neuro-chirurgie pour y subir une intervention, seule thérapeutique susceptible d'apporter une amélioration à son état.

PSYCHOPATHIES CONSTITUTIONNELLES. — J. C. Miller.

A l'occasion de la présentation d'un pervers instinctif âgé de 17 ans, et n'offrant aucune autre particularité du côté intellectuel ou somatique, l'auteur rappelle la diversité et la grande fréquence des infirmités mentales congénitales; il fait ressortir leurs tendances évolutives, et la possibilité fréquente d'appliquer une prophylaxie utile.

A côté du sujet de cette étude qui est un anormal du caractère et d'allure extérieure sensiblement normale, l'auteur présente deux anormaux de l'intelligence, dont les dystrophies très accentuées et le gros déficit intellectuel font contraste avec le bon développement général du premier cas.

Enfin, les anomalies mentales peuvent être par elles-mêmes des causes primitives d'internement, au moins dans leurs types extrêmes, tels les cas présentés (pervers instinctif, idiot mongolien, imbécile brutal et exhibitionniste).

SYNDRÔME CÉRÉBELLEUX POST-TRAUMATIQUE.—S. Caron et C. A. Martin.

Les blessures du cervelet sont rares et résultent à peu près toujours de traumatisme sous-occipitaux.

La malade présentée deux mois après son accident a subi une fracture syncipitale avec enfoncement qui a déterminé un état commotionnel grave, des troubles pyramidaux d'origine corticale, un pseumencéphale de la fosse cérébelleuse, un hémisyndrome cérébelleux.

Ce syndrôme est attribué à la contusion indirecte du cervelet.

ACQUISITIONS RECENTES DANS LE TRAITEMENT DE LA MYASTHENIE.—G. Desrochers.

Au cours de la présentation d'un cas de myasthénie, l'efficacité de l'épreuve diagnostique à la prostigmine est démontrée.

L'auteur en profite pour relater les étapes de la thérapeutique médicamenteuse depuis 1930 et souligne les résultats obtenus par l'éphédrine, le glycocolle, la prostigmine, la guanidine et les sels de potassium.

Il envisage ensuite la question de la thérapeutique chirurgicale par extirpation de tumeur ou d'hyperplasie du thymus, telle qu'elle se présente à l'heure actuelle et conclut à l'existence d'une relation quelconque entre les anomalies thymiques et l'évolution de la myasthénie.

Une séance de cette Société eut lieu à l'Hôpital du St-Sacrement, 19 février 1943. Suivent les résumés des travaux présentées à cette séance.

CIRRHOSE PIGMENTAIRE (hémochromatose des Américains).—R. Lemieux et H. Nadeau.

Les auteurs présentent un cas de cirrhose pigmentaire chez un sujet âgé de 37 ans. La maladie en est à la phase de début puisque les premiers symptômes sont apparus il y a moins de six mois. Le syndrôme est déjà nettement constitué; il se caractérise par une pigmentation foncée de la peau, une cirrhose avec hypertrophie marquée du foie et de la rate, une insuffisance endocrinienne se traduisant par une hypotension continue, un abaissement marqué du métabolisme basal, une diminution des caractères sexuels secondaires. L'examen histologique d'un fragment de peau fait voir une infiltration des couches profondes par une grande quantité de granulations

ferrigineuses. L'étiologie n'a pu être déterminée dans le cas présent. Cette observation permet d'envisager certains aspects pathogéniques du syndrôme en cause.

L'EMPLOI RATIONNEL DE L'OPOTHÉRAPIE (les hormones sexuelles).—A. Martel.

Les hormones sexuelles sont des produits puissants, très actifs, qui doivent être employés avec précaution et discernement puisque, dans bien des cas, la dose thérapeutique voisine la dose toxique. L'emploi, à des doses audacieuses et de façon empirique, des hormones gonadotropiques (hypophysaires et chorioniques) ainsi que des hormones sexuelles mâles et femelles expose à des accidents dont particulièrement l'inhibition de certaines glandes que l'on croyait stimuler. Lors de la ménopause, l'administration d'œstrogènes ou d'androgènes à des doses fantaisistes peut aggraver le déséquilibre de cette phase de la vie génitale.

BIOPSIE FONCTIONNELLE.—F. Gagnon et L. Cayer.

La biopsie de l'endomètre ou biopsie fonctionnelle consiste dans le curettage partiel de la muqueuse utérine, à un moment donné du cycle menstruel afin de connaitre, par l'histologie, le bon ou le mauvais fonctionnement lors de perturbations de la menstruation.

Cette épreuve-diagnostic est basée sur les travaux de Krundat et Engelmann, en 1873, et plus particulièrement sur ceux d'Hitschmann et Adler en 1908. En effet, à la suite de leurs observations, ces derniers en étaient arrivés à la conclusion que la moqueuse utérine, dans sa couche superficielle (fonctionnelle), était le siège de modifications importantes au cours du cycle de la menstruation. De plus il leur avait été permis de différencier, suivant l'aspect histologique de la muqueuse, une phase proliférative sous la dépendance du follicule de Graaf, une phase sécrétoire en relation avec le corps jaune, et une phase menstruelle correspondant au flux sanguin même de la menstruation.

En un mot l'endomètre devenait le miroir de l'ovaire et un moyen simple de lire les images reflétées réside dans cette biopsie fonctionnelle. Cette dernière peut se pratiquer à domicile, au bureau ou à l'hôpital et sans anesthésie, du moins dans la majorité des cas.

La patiente est mise en position gynécologique, une désinfection vulvaire est faite, un spéculum introduit et le col saisi avec une pince. Après désinfection du vagin et du col utérin avec un antiseptique quelconque, une hystérométrie est pratiquée avant d'introduire la canule biopsique ou la curette.

Habituellement, il n'est pas nécessaire de dilater le col, mais si ce dernier est étroitement fermé une dilatation préliminaire sera faite à l'aide de dilatateurs de calibres progressivement gros, ce qui ne nécessitera alors aucune anesthésie. Une fois l'instrument introduit, des débris de muqueuse sont extraits et déposés dans une solution fixatrice pour être envoyés au laboratoire d'anatomo-pathologie.

Le meilleur moment pour pratiquer une telle intervention est entre le 10e et le 14e jour, puis entre le 24e et le 28ième du cycle. Cependant si une seule biopsie doit être faite, il est préférable de choisir le moment le plus rapproché du flux menstruel et même, selon certains auteurs durant les 4 premières heures de la menstruation.

Les contre-indications à une telle opération sont les suivantes: toute infection pelvienne afin de ne pas étendre le processus infectieux, toute aménorrhée dont le doute de grossesse n'est pas levé par une réaction biologique de l'état gravide, et enfin les perturbations de la menstruation lors de la puberté dont l'instabilité est plutôt justifiable de l'essai d'un traitement médical lorsque l'examen du petit bassin demeure négatif. En dehors de ces cas, tout trouble du processus physiologique du tractus génital dont les symptômes justifient une investigation ou un traitement peut être soumis à la biopsie fonctionnelle.

En terminant, rappelons que si une telle opération peut être largement pratiquée, pour déterminer l'activité endocrinienne de l'ovaire et rendre ainsi plus facile le diagnostic de telle ou telle perturbation de la menstruation, il faut par contre être très prudent dans l'interprétation des résultats obtenus puisque les causes d'erreurs sont assez nombreuses actuellement encore.

Correspondence

Phosphorus Burns

To the Editor:

Dr. I. M. Rabinowitch, who has been producing my booklets on Chemical Warfare and has been my adviser on the same subject for the past year, has submitted to me his article, "Treatment of phosphorus burns", which he tells me you are publishing in the next issue of your *Journal*.

The purpose of this note is to thank you very sincerely indeed for the fact that you are producing this important article in the near future and thus making available to the medical profession of Canada the scientific data contained therein. It is of the utmost importance that the medical profession should know at the earliest possible moment the latest treatment for such injuries as are described, because we do not know when or where the deviltries of our enemies may inspire them to make an attempt to inflict such injuries upon our population. For that reason, I very deeply appreciate the co-operation you are giving my office through your *Journal*.

Yours very sincerely,

R. J. MANION, M.D.,
Director.

The Overseas Bulletin

To the Editor:

I have appreciated your sending the Canadian Medical Association Overseas Bulletin. I feel more like a part of the Canadian Medical Profession than I have done in the last four years. Having experienced the workings of Health Insurance in England I have been able to understand the problems the Association is faced with.

Should Health Insurance be in force on my return to civilian life will I be considered a general practitioner or a specialist? (*Dr. Worral then lists a number of appointments he has held*). Can you help me with my problem in any way?

J. D. WORRAL,
Surgeon-Lieutenant, R.C.N.V.R.

London, England,
January 7, 1943.

Canadian Medical War Services

Medical Officers in the Navy

Nearly two-thirds of the Navy's 289 Medical Officers are between 25 and 30 years of age, more than three-quarters are 35 or younger. Only 29 M.O.'s are over 40 years of age. University of Toronto has contributed the most, 92, McGill second with 71, Queen's 35, Manitoba 24, Alberta 17, Western 16, Dalhousie 14, Montreal 9, Laval 1, United States 6.

The R.C.N. has 40 physicians continuously on loan to the Royal Navy for two-year periods. All are aged 30 or less. "It's amazing what they have been through", Captain McCallum commented. "Two were at the evacuation of Crete with its bombings and blastings, one of whom is now at Ceylon, two have had ships lost from under them, one of whom received the Distinguished Service Cross and the other was mentioned in despatches. At least four others have survived the sinking of their ships. In addition four men have received decorations and two others were mentioned in despatches.

Surgeon-Lieutenants who have returned to Canada after two-year duty with the Royal Navy are: C. G. Campbell and A. M. Pain of Hamilton, Ont.; W. A. Clark, Sussex, N.B.; T. G. T. Davis, Gananoque, Ont.; C. W. Danby, Kingston, Ont.; W. J. Elliott, Parksville, B.C.; N. D. Hebb, Halifax; W. D. Love, Penticton, B.C.; W. Locke and J. L. Silversides of Winnipeg; T. P. Watson, Mount Royal, Que.; R. A. G. Lane, A. G. McKinnon, J. G. Rathburn, and H. G. Swan, Toronto.

Three of the four medical officers lost by enemy action were on loan to the Royal Navy. Three of the officers were the sons of physicians and the fourth, William J. Winthrope, Saskatoon, was the son of a dentist. George A. Hendry, of Toronto, was lost in H.M.C.S. *Ottawa*, Dr. Winthrope was killed at Ste. Nazaire, John Edmund Powell, of Montreal, was lost with a R.N. aircraft carrier and Jacques de Lorimier Bourgeois, of Montreal, was killed at the storming of Oran. One Medical Officer is a prisoner of war in Germany, Surgeon-Lieutenant C. M. Fisher, captured when the *Voltaire* was sunk off West Africa.

Specialists in the Army

A specialist in medicine and an outstanding surgeon have been teamed in each of four regions in Canada to take modern advances in medicine to medical officers in all military camps of Canada, Brigadier J. C. Meakins of the Royal Canadian Army Medical Corps said today. The eight specialists will among them visit regularly every medical unit of the Canadian army, taking to the Medical Officers professional guidance in newer aspects of medicine and surgery.

Clinics are being conducted by the specialists in varieties of army medical problems, ranging from sore feet to insect control. Liaison also has been arranged through the National Research Council for the exchange between Canada and United States of the studies into climatic and health conditions of the far-flung battlefields of the world where Canadians may be sent.

"Each consultant has his own interest," Brigadier Meakins said. "The clinics on foot disability are studying rules on how to jump, for instance, in order to avoid or to mitigate foot troubles. If a man drops from a height on his toes, with knees bent, he probably won't be hurt; but if he has flat feet he can't land on his toes in the same way because there isn't the same resiliency and he is liable to break his heel or his hip as the shock of landing goes straight up his body. Moving pictures are being taken to help show proper jumping methods.

"Improper walking or marching will help induce foot troubles, particularly when a man is carrying a 60-pound pack. Thousands of men in the army are on sick parade every day with sore feet which sometimes ache as painfully as any tooth. We find that putting the foot at rest is the worst thing that can be done, the muscles simply become lax. The best way to cure foot troubles is by exercise, strengthening the muscles. The consultants are showing Medical Officers how the men may best do such foot exercises. Sometimes a minor correction in the man's boot will overcome his trouble and the medical officers are being shown what to look for in shoe-fittings."

All accidents in training are being carefully studied by the consultants, all but two of whom have held prominent teaching posts in medical schools. These army accidents are segregated as between basic and advanced training schools, are totalled for all camps in the country and are carefully studied as to cause and prevention. "The great stress in the army is on prevention," said Brigadier Meakins. "Once the accident has occurred the soldier is a casualty. We want to prevent casualties."

"The problems of black flies, tics, mosquitoes and other seasonal insects from the land are among the clinical studies. They are not only a discomfort and irritation, but also carry disease," said Brigadier Meakins. "We are co-operating with civilian health authorities to prevent the insects propagating. It is impossible to do that completely, but we might mitigate their effect. Screens are not enough to protect the soldiers, we will use insecticides to fumigate their quarters. Each soldier also will be trained in the use of insect repellants on his person outdoors."

University Notes

University of Toronto

The University of Toronto announces the award of the Charles Mickle Fellowship for 1942 to Arthur Lawrie Tatum, B.A., M.S., Ph.D., M.D., professor of pharmacology in the University of Wisconsin, for his valuable work in pharmacology. His outstanding contribution was the study of the arsphenamine-like substances which led to the introduction of mapharsen for the treatment of syphilis.

This fellowship, bequeathed by the late Dr. W. J. Mickle, is the income from an endowment of $25,000 and is awarded annually to that member of the medical profession who is considered by the council of the Faculty of Medicine of the University to have done most during the preceding ten years to advance sound knowledge of a practical kind in medical art or science.

The Balfour lecture in the Faculty of Medicine, University of Toronto, will be given on April 5 by Dr. James Masson, Chief of Surgery, the Mayo Clinic.

Abstracts from Current Literature

Medicine

Obesity. Newburgh, L. H.: *Arch. Int. Med.*, 1942, **70:** 1033.

The author refers to the question of average weight. His conclusion is that the weight at thirty years of age is the most desirable weight for the remainder of a person's life. There is a definite hazard of overweight. Apparently twenty-five pounds extra weight cuts down life expectancy by 25%. Again, fifty pounds overweight at forty-five affects mortality as much as valvular heart disease according to estimates made from records of insurance companies.

Hypothyroidism, although usually regarded as a cause of overweight is not found to have any direct connection with this condition. Many cases of hypothyroidism are underweight. The pituitary is also not accepted as a cause of obesity. Cushing's theories are referred to, in which he argues that disturbance or removal of the pituitary results in a metabolic "shift" which produces increased deposition of fat. The author feels very strongly that endocrine products have been used unscientifically in that they have been given to cases without sufficient investigation. He believes for instance that cases of undescended testicle which responded to organotherapy would have been normal at puberty if left alone. The environment and management of young people is considered very important. Cases are quoted where the overweight was obviously the result of the child's activities being restricted because of an alleged heart condition, etc. Heredity is often given as the explanation but can only be responsible for the type of bodily frame. The habits of eating and living must be blamed for the overweight. Again, women in middle life tend to put on weight around and below the hips but in the author's opinion although they start with the handicap of wider hips they do not accumulate extra fat in this region unless they are over-eating. The conclusion is that many people develop the habit of over-eating because life has disappointed them in various ways, and that once the habit is formed the body adjusts itself so that their appetite is increased well above normal. Coming to treatment he does not think exercise is an answer except as regards general health. A radical reduction of diet with stern control is absolutely necessary and not dangerous. Skimmed milk is valuable, also avoidance of fried foods because of the fat used.

P. M. MACDONNELL

Rheumatic Diseases. Brown, A.: *The Practitioner*, 1942, **149:** 209.

Some clarification has come into the nomenclature of these diseases during the year. "Debunking" of wheat from chaff has resulted from Hench's "Critical survey of the American literature". The treatment of rheumatic diseases has shown no striking advance. Four major forms are encountered, namely, (1) acute rheumatism (rheumatic fever); (2) rheumatoid arthritis; (3) osteo-arthritis; and (4) fibrositis.

All reports agree on the important relationship between group A hæmolytic streptococci and rheumatic fever. The abnormality consists in delayed inadequate response to the primary throat infection, with the result that viable organisms remain in inaccessible tissues after the healing of the primary focus and the reticulo-endothelial cells are sensitized, which is considered "constipation" of the reticulo-endothelial cell.

Rheumatoid arthritis.—Focal infection still leads in the various hypotheses. Emphasis is laid on remission caused by two dissimilar conditions, hepatitis, and pregnancy. There seems to be a psychological problem here. During the 1941 bombings in London, rheumatoid arthritis increased. The necessity of nursing a sick relative, ill with rheumatoid arthritis, often antedated an attack. Sedimentation rate calculation proved of marked value in estimating the severity as also did the clinical progress. Microcytic hypochromic anæmia is nearly always present. Both the acute rheumatic and rheumatoid forms were found improved by salicylates. The relative increase in the carbohydrate content of the diet does not seem to increase the relative incidence of the disease. Gold salts (myocrisin) seem to be of value in treatment. Occupational therapy has been of great value from an economic as well as a psychological viewpoint.

Osteo arthritis.—Here physiotherapy, especially hydrotherapy, has been advocated as the treatment of choice. The use of a vitallium mould in connection with arthoplasty of the hip is advocated. Not many sufferers are willing to accept operation. Increase of mobility and decrease of pain follows morning exercise of the hips, especially while lying in bed and also from flexing the knee on the chest. Properly fitting shoes with sufficient grip about the ankle and a wide heel are necessary.

Fibrositis.—This group contains the largest number of cases the practitioner must treat. The basic treatment remains the same, "rest, warmth, purgation, sweating and massage".

C. R. BOURNE

A Study of the "Shock-Delaying" Action of Barbiturates. Beecher, H. K., McCarrell, J. D. and Evans, E. I.: *Ann. Surg.*, 1942, **116:** 658.

The official report of the Tenth International Congress of Military Medicine and Pharmacy is quoted as saying that experiments indicate that patients to whom sodium amytal is administered early more often survive exposure, delay and transportation, and it seems advisable to equip battalion surgeons and collecting personnel with sodium amytal.

In line with these statements the authors have conducted experiments on dogs to determine the shock-time and the death-time using intravenous sodium amytal as anæsthetic, with ether anæsthetic used in the control dogs. Depth of anæsthesia and criteria of shock were carefully controlled so as to be the same in each dog. Shock was produced in one group by intestinal manipulation and in another by hæmorrhage. The results of the experiments indicate that shock

produced by intestinal manipulation in dogs is slower to appear with barbiturate anæsthesia than with ether, but there is no significant delay of shock produced by hæmorrhage. In these experiments of the administration of 100% oxygen showed no advantage over room air in delaying shock. J. R. LACROIX

The Urinary Tract in Diabetic Women; Its Contribution to the Incidence of Hypertension. Bowen, B. D. and Kutzman, N.: *Ann. Int. Med.*, 1942, **17**: 427.

Complete urological examinations were carried out on 84 unselected diabetic women between the ages of 36 and 79, without regard for complaints that would suggest trouble in the urinary tract. Some degree of involvement of the upper urinary tract was found in 51; abnormal findings in the lower urinary tract were found in 26; only seven had what was regarded as a completely normal urinary tract. The patients were grouped in accordance with the involvement of the lower or upper urinary tracts and those who had a disturbance of the upper urinary tract were subgrouped with respect to the renal function as determined by the 'phthalein test. A comparative study of the incidence of hypertension and of retinal arteriosclerosis was made in the various groups.

A variety of pathogenic bacteria was found, but the *B. coli* predominated in those whose upper urinary tract showed infection. In the patients who had bacteria only in the bladder, the *B. coli* was less frequently found; otherwise, the bacterial flora was about the same as was found in the upper urinary tract group.

The patients who were found to have infections in the urinary tract frequently had no symptoms, or at least none that would be differentiated from diabetic symptoms, either past or present. It is believed that infections of the urinary tract in diabetic women often go undiagnosed because of the difficulty in the interpretation of the examination of urine from the human female. Catheterization under strict aseptic precautions is often justified.

It is suggested that in diabetic women there is frequently a slowly progressive pyelonephritis which may or may not produce a reduction of kidney function either bilaterally or unilaterally. This infection may in some cases be responsible for or contribute to the hypertension which is so common in older diabetic women. S. R. TOWNSEND

Surgery

Frostbite in Shipwrecked Mariners. Brownrigg, G. M.: *Am. J. Surg.*, 1943, **59**: 2, 232.

Survivors of the Battle of the Atlantic arriving at St. John's, Newfoundland, had often been immersed in water just below freezing point and exposed to air temperatures as low as zero. About 75% of those who required hospitalization suffered from lesions of the extremities. Though the terms which might be used to describe these lesions include trench foot, dermatitis congelationis, and immersion foot, it was decided to use the term which accentuates the essential causal factor: cold.

In all the 94 cases requiring hospital care the lower extremities were involved. In some the upper extremities were also affected. The histories were very similar. No pain was noted till they had been rescued. They had been able to move about in the life-boats but lost the use of their legs and suffered pain shortly after being picked up. The presence or absence of footwear did not seem to influence the occurrence or severity of the lesions.

The cases are divided into three groups. Group 1 had pain, swelling, some erythema and all movements present. Areas of anæsthesia rapidly disappeared. Circulation was intact and fever was minimal. Mottling and blebs were present especially on pressure points.

Group 2 included more serious lesions. One or more toes were dark and had lost movement. The toes were cold and anæsthetic and dry gangrene had supervened.

Group 3 were very toxic and had a high fever, marking grave tissue damage. Deep, foul-smelling sloughs developed. Wet gangrene and secondary hæmorrhages were common. The process of frostbite is thus traced from preliminary swelling through superficial dry gangrene to gross necrosis. Exposure to cold, and not subsequent events, determined the damage to tissue.

Treatment consisted in avoiding trauma. Rubbing is considered harmful. Neither pavaex treatment nor paravertebral block is approved. First degree frostbite rapidly recovered with rest, elevation and strict asepsis. Residual stiffness was a problem, but lessened when refrigeration was part of the primary treatment. Conservatism is advised in treating Group 2 cases. The line of demarcation may be more distal than at first appears. Early amputation does not save time, and more tissue is saved when healing by granulation is allowed to occur after trimming necrotic bone. Third degree frostbite necessitates amputation high enough to remove all areas of gangrene. Guillotine amputations were not done, but the operation was considered a life-saving procedure and the problems of prosthesis were not considered then.

Prevention lies in the use of boots which prevent heat loss as well as being waterproof. Soft sealskin is suggested. BURNS PLEWES

Experimental Gas Gangrene. Sandusky, W. R. and Meleney, F. L.: *Arch. Surg.*, 1942, **45**: 890.

The authors present a report of a series of experiments with animals in order to ascertain the effectiveness of the local application of certain of the newer chemotherapeutic agents in fresh traumatic wounds, contaminated with the species of clostridia, commonly associated with clinical gas gangrene in human beings.

They give an extensive review of the literature on this subject over a period of about six years. They endeavour to show why there has been such a lack of unanimity in obtaining results in this experimental work. In their opinion, nothing less than a true-to-life method of effecting trauma, contamination and prophylaxis, or treatment in experimental animals should be employed to draw comparisons with gas gangrene in human beings.

They present a method for the production in experimental animals of wounds contaminated with the species of clostridia associated with clinical gas gangrene. These wounds simulate acute traumatic wounds in human beings, and if untreated, lead in a large proportion of the animals, to the development of gas gangrene and death. When used in such experimental wounds within two hours after production and contamination, sulfanilamide, sulfadiazine, sulfathiazole, and the sodium salts of the latter two are effective in the prevention of death from gangrene in animals whose wounds are contaminated with either *Cl. welchii* or *Cl. septicum*. The effectiveness of zinc peroxide in such wounds has not been convincingly demonstrated by Sandusky and Meleney's experiments.

Further studies must be carried out before the value of the newer chemotherapeutic agents can be properly ascertained. G. E. LEARMONTH

Cardio-œsophageal Resection for Tumour of the Cardia. Brock, R. C.: *Brit. J. Surg.*, 1942, **118**: 146.

An interesting case of non-malignant neoplasm of the cardia is described. Treatment consisted of removal of the cardia and lower end of œsophagus. Repair involved drawing part of the stomach permanently into the thorax. An excellent end result was achieved.

Of greatest interest in the report is the description of the incision used to display both stomach and lower œsophagus. The author believes this incision might be employed more often in place of separate abdominal and thoracic incisions. The skin was incised from the umbilicus upwards in the midline nearly

to nipple height. Tne abdominal cavity was entered up to the xiphisterum. Then, to avoid turning the patient on his side to open the chest, an incision was made from the middle of the abdominal wound obliquely outwards and upwards along the left 6th intercostal space. This incision cuts through everything including the costal margin. The exposure is good because the lower chest and abdomen are thrown virtually into one. The diaphragm was divided for about 5 cm. from its costal attachment to allow the chest wound to spread. J. R. LACROIX

Immediate and Late Results of Perforation of Peptic Ulcer. "Résultats immédiats et lointains de la perforation de l'ulcère peptique." Harrison, C. and Cooper, F. W.: *Ann. Surg.*, 1942, **116:** 194.

Les auteurs discutent cette opinion très répandue que dans les cas de perforation d'ulcère peptique et quand le patient guérit après enfouissement de cette perforation, des accidents et une perforation subséquente sont toujours à craindre. Autrement dit la guérison n'est jamais complète.

L'étude se base sur la présentation de cinquante-sept cas. Les symptômes sont généralement les mêmes: douleurs abdominales soudaines, contracture musculaire, vomissements hémorragiques ou non. La quantité de liquide répandu dans la cavité péritonéale ne dépend pas de la grandeur de la perforation. Mais l'indice d'infection est grandement augmenté par les retards apportés à l'intervention chirurgicale, une fois que la perforation a eu lieu. La mortalité ou du moins la morbidité se trouve accrue concommitamment par l'hémorragie et les complications de la perforation. Le pourcentage de récidive des symptômes de l'ulcère après l'opération et une simple fermeture de la perforation offre la proportion de 82.5%.

Si d'autres symptômes d'ordre ulcéreux surviennent à la suite d'un traitement chirurgical pour ulcère, le malade doit être examiné entièrement de nouveau et traité exactement comme n'importe quel autre cas d'ulcère peptique. PIERRE SMITH

Obstetrics and Gynæcology

Some Aspects of Early Human Development. Rock, J. and Hertig, A. T.: *Am. J. Obst. & Gyn.*, 1942, **44:** 973.

Seven very young normal human conceptuses and five abnormal ones have been recovered from twelve of 60 excised uteri. One of the normal specimens, estimated to be seven to eight days old, is as far as the authors know, the youngest human embryo yet reported. The others range in age up to sixteen to seventeen days. By comparison of the age of the embryo with the associated endometrial biopsy it appeared that ovulation in two well-controlled cases occurred about fourteen days before the anticipated dates of menstruation.

From a consideration of three ova estimated to be 7.5, 9.5 and 12.5 days old, we learn that nidation takes place at a variable age of the embryo, perhaps from the fifth to the eighth day of age, and on an endometrium which may vary in phase from the nineteenth to the twenty-second day of a twenty-seven day cycle.

The seven normal conceptuses were found on the posterior wall of the uterus, and the five abnormal ones on the anterior wall, probably a correlation which will not hold when more specimens are collected. The locus of nidation is not affected by the side on which the egg enters the uterus.

Five (42%) of the twelve young embryos were so altered as to indicate probably early abortion. This figure is of course higher than the percentage of abortions among diagnosed pregnancies. It is conceivable that more cases will show a lower proportion of defective ova. It seems likely from the findings, however, that either many pregnancies abort before recognition, during apparent normal menstruation, or that cytologic improvement takes place in some formerly abnormal conceptuses. ROSS MITCHELL

Erythroblastosis or Congenital Syphilis? Observations on Erythroblastosis and its Differential Diagnosis from Congenital Syphilis. Henderson, J. L.: *J. Obst. & Gyn. Brit. Emp.*, 1942, **49:** 499.

The principal features of the common fetal and neonatal disease known as erythroblastosis fetalis have been summarized. There are four clinical types of the disease. (1) Anæmia hæmolytica, the mildest form, which often escapes notice unless severe. Spontaneous recovery usually occurs. (2) Icterus gravis, in which severe jaundice is seen either at birth or within a few hours thereof. Spontaneous recovery may occur, but blood transfusion is often necessary. The mortality is about 50%. (3) Hydrops fetalis in which universal œdema precludes the establishment of independent life and stillbirth occurs. (4) Hepatic degeneration and cirrhosis with intra-uterine death and severe maceration of the fetus.

Four cases of the most severe type of erythroblastosis with intra-uterine death of the fetus have been recorded in detail, as this type of the disease is not well known. It is usually mistaken for congenital syphilis on account of the intra-uterine fetal death, which may have occurred in previous siblings also, the diffuse hepatic cirrhosis, and the greatly enlarged pale pink placenta which most people have been taught to regard as syphilitic.

The differential diagnosis of erythroblastosis and congenital syphilis is discussed. The histological features of the placenta in the two diseases have been contrasted and found to show distinctive features.

Erythroblastosis fetalis is the only disease in which persistence to term of the Langhans' layer of cells in the chorionic villi is known to occur. P. J. KEARNS

Uterine Contractility During Labour and the Effects of Parity and Dystocia upon it. Murphy, D. P.: *Surg., Gyn. & Obst.*, 1943, **76:** 60.

One hundred and five cases were studied with the Lóránd Tocograph, which detects and records uterine activity through the abdominal wall. The results are given in detail. The conclusions to be derived from them agree in the main with long established clinical observations.

1. As labour advances there is an increase in uterine tonus, in the strength of contractions, in the total amount of energy expended, and in the frequency of contractions.

2. As labour advances the duration of the contractions becomes less. This fact has perhaps not hitherto been suspected.

3. Multiparæ experience, significantly, stronger contractions throughout labour than do primiparæ.

4. Primiparæ experience a significantly higher tonus throughout labour than do multiparæ.

5. Dystocia increases the already high tonus of primiparæ and the strong contractions of multiparæ and prolongs the duration of contractions of all patients. J. R. LACROIX

Oto-Rhino-Laryngology

Earache: The Common Causes and Probable Nerve Pathways. Tremble, G. E.: *McGill Med. J.*, 1942, **11:** 9.

The author has presented in a systematic manner the common causes of earache, the treatment of its simpler manifestations, and a comprehensive explanation of the nervous pathways involved. Briefly, the sensory nerve supply of the external and middle ear is multiple and includes C2 and 3, cranial nerves Nos. 5, 7, 9, 10 and sympathetic branches from the carotid plexus. The exact distributions of these nerves are indicated. Ear pain may be attributed either to direct irritation of the aural branches of any of the above nerves (intrinsic earache), or it may be of reflex origin (extrinsic earache). In the former case aural

examination would reveal the cause, whilst in the latter, a search must be made for a remote site or irritation along the entire sensory supply of any of the above nerves.

Contributing factors to intrinsic earache would be the presence of foreign bodies, ceruminous accumulations, furuncles of the external canal, acute and chronic otitis media and mastoiditis. Treatment includes the appropriate choice of syringing, application of solutions such as evaporating lead etc., sulfathiazole locally and orally, autogenous vaccines, paracentesis of the drum or mastoidectomy.

For practical purposes common primary sites of irritation which may lead to reflex otalgia (extrinsic earache) all begin with the letter T—teeth, tongue, tonsils, tubes, throat, trachea. It is noted that ear pain is only rarely associated with nasal catarrh, sinusitis, infected lymph glands in the neck, goitre or caries of the cervical vertebræ. Neurotic women may complain of ear pain, and the pain of migraine may occasionally be localized to the ear.

BARBARA E. W. BARKER

Bilateral Paralysis of the Abductor Muscles of the Larynx: seven patients treated by B. T. King's Method. Morisson, L. F.: *Arch. Otolaryngol.*, 1943, **37:** 54.

The cases of abductor paralysis are divided into two groups: those with gradual onset, in which the progressive loss of function results from extralaryngeal insult in the immediate neighbourhood or from an intracranial lesion; those with abrupt onset, following some acute infectious disease or the cutting of one or both laryngeal nerves during an operation in or about the thyroid area. The appearance of the vocal cords is different in these two groups, *i.e.*, as to cadaveric position and adducted cords. The majority of cases seen are included in the second group.

These patients with bilateral abductor palsy should be further classified as to whether they are tracheotomized or not. The tracheotomized group has an adequate air intake, but they soon forget the great relief the tube afforded. The annoyance of the tube, its demand for constant attention, the psychic trauma due to the necessity of explaining to the curious tend to outweigh the advantages of even a most efficient valve tube, Tucker type. For the second group, stairs are unsurmountable obstacle; patients must neither hurry nor become excited; acute infection of the respiratory tract and associate laryngitis are frequent; a medical or surgical adviser encouraged the patient to carry on for a while longer because there was no exact measure that offered reasonable assurance of both an adequate airway and a usable voice.

The memories of the corrective measures proposed in the past pointed to rather frank failures, until Dr. B. T. King's preliminary report in 1939 on his own operation.

The operation should not be undertaken with a living patient until the various steps have been worked out in detail a number of times on the unfixed cadaver. The author uses the Kocher thyroid incision instead of the original procedure laying down parallel to and along the border of the sternocleidomastoid muscle.

The results obtained by the author on seven cases of postoperative abductor paralysis show that when properly carried out the King operation is a satisfactory procedure in that both an adequate airway and a usable voice may be expected. In some instances it may be necessary to operate on one side first and on the other a few months later. In his conclusion the author says: "The King operation fulfils all its promises. It has no restriction as to age and is not limited by either the cause or the duration of the paralysis. VALMORE LATRAVERSE

Radiology and Physiotherapy

The Value of the Roentgen Therapeutic Test Done in Differential Diagnosis of Mediastinal Tumours. Reynolds, L. and Leucutia, T.: *Am. J. Roentgen.*, 1942, **48:** 440.

On the basis of the irradiation response, it is possible to place the mediastinal tumours into four rather arbitrary groups.

Group 1.—Tumours originating from the proliferation of the highly radiosensitive lymphocytic cell element, such as lymphocytoma; mediastinal manifestations of aleukæmic leukæmia, pseudoleukæmia and lymphatic leukæmia; and lymphosarcoma of the thymic gland. The regression of these tumours following the administration of the roentgen therapeutic test dose is spectacular. They completely "melt away" within two or three weeks after treatment.

Group 2.—Mediastinal tumours containing predominantly reticulo-endothelial or embryonal spindle-cell elements, such as mediastinal Hodgkin's disease which dominates this group, reticulum-cell sarcoma, endothelioma and embryonal spindle-cell sarcoma. The rate of regression of these tumours is moderate. After two weeks there is a 25% reduction in size, after six weeks 50% or more reduction and after three months nearly always complete disappearance. In this group, often a second series of radiation therapy is given after the six weeks' period, as a rule with considerably lesser dosage. If later a recurrence develops, as sometimes happens especially in the sarcomas, the technique of future irradiation is guided by the individual circumstances.

Group 3.—Other malignant tumours of the mediastinum, such as fibrosarcoma, melanosarcoma, carcinoma of the thyroid and thymic glands, teratoma, etc. The rate of regression of these tumours is slow. After two weeks, there is hardly any reduction in size, after six weeks there is a 20 to 50% reduction and after three months in the majority of the cases there is again progression. In some instances, by administering further intensive irradiation, a notable prolongation of life or even five-year survival is obtained.

Group 4.—Benign tumours of the mediastinum such as neuroganglioma, dermoid cyst, chondroma, fibroma, lipoma, etc., and pseudotumours, such as aneurysm, encysted fluid, encapsulated abscess, echinococcus cyst, etc. These tumours are uninfluenced by the administration of the roentgen therapeutic test dose, so that periodical checkup examinations reveal no change or very slow increase in size, compatible with the nature of the lesion. A possible exception is the large fibroma which seems to behave in a manner similar to that observed in large uterine fibroids. R. C. BURR

Pathology and Experimental Medicine

Equine Encephalomyelitis (Western) in Man—A Histologic and Anatomic Study. Peers, J. H.: *Arch. Path.*, 1942, **34:** 1050.

Thirteen brains from victims of the 1941 epidemic of equine encephalomyelitis in the North Central states and Manitoba were subjected to detailed examination. From seven of the thirteen brains the Western strain of equine encephalomyelitis virus had been isolated. Three varieties of lesions were found: nodules of microgliosis, spongy areas of partial destruction of ground substance and perivascular round cell infiltration. The inflammatory process caused by equine encephalomyelitis virus in man is more widespread and more severe than that observed in any other recognized variety of encephalomyelitis. Poliomyelitis destroys nerve parenchyma to a comparable degree but the lesions in the cerebral cortex are sharply limited to the precentral gyri and they are maximal in the tegmentum of pons and medulla, whereas no single region or structure of brain parenchyma appears entirely resistant to equine encephalomyelitis virus.

Dissemination of the virus by the blood stream is a hypothesis suggested by animal experiments and by the probability of an insect vector; further support of this concept is afforded by the diffuse pattern of distribution described by Peers. There is no evidence of a neuronal path of transmission and the relative scarcity of lesions in the periventricular tissues discredits the possibility of an important rôle for the cerebrospinal fluid. Tissue susceptibility may be the factor responsible for the concentration of lesions in the caudate nucleus and putamen. Lesions found in the interlacing gray stripes which cross the internal capsule between caudate nucleus and putamen possibly have a rôle in the clinical picture of inconstant, fluctuating spasticity and variable response to Babinski stimulation.

This study does not clarify the relationship between eastern and western varieties of the disease. The abundance and distributions of the lesions are comparable. Polymorphonuclear leucocytes are predominant in the inflammatory lesions of parenchyma, vascular structures and meninges in the eastern type, whereas lymphoid cells and monocytes of microglial origin play the principal rôle in the lesions produced by the Western strain. Spongy ground substance is rarely described in studies of lesions produced by the eastern strain. WILFRED E. TORESON

The Adrenal Cortex in Essential Hypertension. Dempsey, W. S.: *Arch. Path.*, 1942, **34:** 1031.

Dempsey studied the adrenal glands from a series of autopsies on adult cases in an attempt to confirm the previous observation of Rinehart, Williams and Cappeler, who had found adenomatous hyperplasia of the adrenal cortex with increase in weight of the adrenal glands almost regularly in association with essential hypertension. In accordance with rigid criteria 19 cases of hypertension and 50 non-hypertensive control cases were selected for study. The adrenals from the hypertensive group were not grossly distinctive nor was there a statistically significant difference between the weights of the adrenals in the hypertensive cases and those in the control cases. Actual cortical adenomas and adenomatous hyperplasia were found microscopically in several cases of both groups. Thus Dempsey's study failed to confirm the previous report. WILFRED E. TORESON

Supplementary Feeding in Industry. Haggard, H. W.: *J. Indust. Hyg. & Toxicology*, 1942, **24:** 332.

Haggard questions the stand taken by the Council on Foods and Nutrition of the American Medical Association on the matter of vitamin supplements in industry. The statement of the Council is to the effect that deficiencies in vitamins, if they occur, should be made good by an adequate diet of natural foods. Haggard thinks this statement might be sound in peace time when there is less urgency for the full development of efficiency, but in war time the need for maximum production is compelling and if it can be demonstrated that the addition of vitamin concentrates does in fact result in increased production that should be sufficient reason for their use.

A carefully controlled experiment in industry is difficult to plan. Conditions similar to those obtainable in animal experiments cannot be secured. In the experiment reported in this article two groups of 500 men each were used. These two groups were reasonably comparable as to age, working conditions, etc. Individual records were not obtainable but good group records were available. The supplement used with the experimental group contained the vitamins estimated as needed to meet daily requirements and also the main minerals (details of the supplement are not given). Records of production, absenteeism and spoilage were obtained for two months prior to the experimental period and for two months of the experimental period. The following figures give arbitrary but comparable figures for spoilage and production and days lost per 1,000 days worked for absenteeism.

EXPERIMENTAL GROUP

(Nov.-Dec.)	*spoilage*	*absenteeism*	*production*
Pre-experimental period	78	36.4	9.37
(Jan.-Feb.)			
Experimental period...	44	37.2	10.11

CONTROL GROUP

(Nov.-Dec.)	*spoilage*	*absenteeism*	*production*
Pre-experimental period	73	41.6	8.08
(Jan.-Feb.)			
Experimental period...	68	50.7	8.56

It is to be noted with regard to absenteeism that although there was an increase in the experimental period this was less than the expected seasonal increase. FRANK G. PEDLEY

Hygiene and Public Health

Mortality Record for 1942. *Stat. Bull., Metropolitan Life Insurance Co.*, 1943, **24:** 1.

The records of the Industrial Department of the Metropolitan Life Insurance Company usually give a good indication of the health of the population as a whole of the United States and Canada. These indicate that in 1942 health conditions remained good. The favourable picture resulted chiefly in a decline in death rates in early childhood and at ages over 55. In the intermediate ages the mortality of 1942 exceeded that of 1941. This increase in mortality was largely due to deaths among military personel from accidents, disease and enemy action. The tuberculosis death rate, which was expected to rise, did not do so; the mortality rates per 100,000 from this disease were: 1940, 44.6; 1941, 42.8; and 1942, 41.7. Diseases of the coronary arteries continued to rise in 1942, as did accidental deaths. In connection with accidents, however, it is to be noted that motor vehicle deaths showed a rather marked decline in 1942; the rates for this cause of death were: 1940, 18.2; 1941, 20.8; and 1942, 16.8. Pneumonia mortality continued its favourable trend in 1942, the mortality rates from influenza and pneumonia combined were: 1940, 43.4; 1941, 38.3; and 1940, 33.6. FRANK G. PEDLEY

Accidental Deaths During 1942. *Stat. Bull., Metropolitan Life Insurance Co.*, 1942, **23:** 9.

Accidental deaths took fewer lives in the United States during 1942 than in 1941. The decrease in deaths was due to the sharp fall in automobile fatalities. Motor vehicle deaths may be down as much as 12,000 for the year. In other respects the accident fatality rate will probably be higher, that is for home accidents, public accidents other than automobile accidents and occupational accidents. Complete figures are not yet available. FRANK G. PEDLEY

Obituaries

Alexander Kippen Cameron. The death of Dr. Cameron, has taken one more of the pioneer doctors of the Saskatoon District.

Dr. Cameron spent his earlier years in northern Manitoba, and in the fall of 1903 entered the Manitoba Medical College, where he at once became a favourite with the students. Finally settling in Delisle, a progressive town thirty-four miles from Saskatoon, the doctor made an enviable reputation in his profession. His practice took in a vast territory which included the surrounding districts of Vanscoy, Donavon, Laura and Swanson. He had taken on a big job and did it well. But, facing the rigours of Canadian Western winters wore down even his rugged constitution, and Dr. Cameron, therefore, found it necessary to give up much of his work, though his interest in medicine never lessened.

As a hobby, Dr. Cameron began raising such animals as the fox, mink, badger, martin, and the fisher. His hobby grew to be one of the finest fox ranches in the country. When the time came for his retire-

ment the doctor resorted to his hobby, moving his ranch to Grandora.

Dr. Cameron was buried in Saskatoon, Saturday, February 27th, and the large number of people who were present at his funeral, in face of tne difficulties of almost impassable roads, was but a tribute to the character of a great man and real doctor.

JOHN A. VALENS, M.D.

Dr. James Malcolm Dalrymple, of Toronto, died February 20th, from heart disease. He graduated M.B. University of Toronto in 1905 and did post-graduate work in Chicago before the last war and in England after the war was over. He served in Toronto as captain in the C.A.M.C. during the war. In 1934 Dr. Dalrymple contested the Dovercourt riding of Toronto in the election of the Ontario Legislature. He was past president of the Central Liberal Club of Toronto. On the opening of St. Joseph's Hospital he was appointed to the surgical staff and was active up to the time of his last illness.

He was a member of the Lake Shore and Royal York Golf Clubs, the Academy of Medicine, the Canadian and Ontario Medical Associations and a life-member and past president of Toronto Central Liberal Club.

Dr. William Henry McFarlane died suddenly at the Calgary General Hospital, on January 23, 1943, while he was attending an operation. His death at the comparatively early age of fifty-four has left a vacancy in the ranks of his confrères in Calgary which will be difficult to fill. He was held in high esteem and was greatly respected by his many friends and patients. For many years he was a member of the firm of Doctors McEachern, McFarlane, Jennings and Ingram.

Dr. McFarlane was born near London, Ont., and graduated from Western University as gold medallist of his year in 1911. Following his graduation he took a postgraduate course in London, England, and later practised at Wallacetown, Ont. He served with the Canadian Army Medical Corps in the last war. He came to Calgary in 1919 and soon identified himself with hospital and medical society affairs and was recognized as a physician of fine attainments. He served as president of the Calgary Medical Society.

He is survived by his wife and a daughter, Dr. Margaret West, a graduate of the University of Toronto, and her son.

Dr. A. T. Ripley, of West Lorne, Ont., died on February 18th at the age of sixty-seven. He was a graduate of University of Toronto in the class of 1906. He was formerly coroner of Elgin County.

Dr. Robert L. Ross, of Morris, a beloved pioneer physician of Manitoba, died on February 9th, after a long illness.

Born in Oxford county, Ont., in 1869, he was educated in the public schools of Kincardine. Coming to Manitoba in 1889 he attended the normal school and then taught for a few years until he decided to change his vocation. He graduated from Manitoba Medical College in 1898 and practised at Morris for 38 years. Mayor of the town for several years, he was interested in community enterprises and in politics. On one occasion he contested the Morris seat in the Manitoba Legislative Assembly against the late Colin H. Campbell, attorney-general. Other interests were the United Church, the Masonic order, and sports, especially curling. He is survived by his widow, two daughters, and two sons, Lieut. Bryan Ross, an officer with the Royal Canadian Engineers overseas, and Dr. E. L. Ross, superintendent of the Sanatorium Board of Manitoba and of Ninette Sanatorium.

News Items

Alberta

The Provincial Government has placed in its estimates a sum to establish a blood plasma plant which is intended to furnish processed blood to all parts in the Province where needed.

The further development of the Cancer Services will assume the cost of hospitalization whenever the Diagnostic Clinics decide that such care is desirable. The appropriation for the cancer services will amount to $102,500.00, which covers, in addition to hospitalization, surgery and radium and x-ray therapy.

Owing to the scarcity of rural physicians, there will be an increase of district nurses with special training in maternity work. It is also planned to give a select number of nurses special training in the Kenny treatment of poliomyelitis, in case of another epidemic.

The Provincial budget indicates that the Province of Alberta, by cutting the rate of interest on its bonds has been saved $3,000,000 per year. This cut in interest lost the Workmen's Compensation Board some $500,000 all of which had to be made up by taking more from industry.

At the last session of the Provincial Legislature a special committee of the members of the house was appointed to look into the workings of the Workmen's Compensation Act with a view to making recommendations to the Government. This report has been presented to the Legislature.

The Medical Aid fund deducted from the wages of the workmen during the six-year period 1936-1941, amounted to $2,110,956.00, while during the same period there was collected from industry $7,612,238.00. It is now proposed that all shall be collected from industry. At the present time there is a curious situation. The Board, according to the Act, has built up a medical reserve of $214,272.00; that is, if they have a surplus in that fund any one year, the surplus is put into the fund; but when there is a deficit in the fund, that deficit is made up from the Accident Fund, paid by industry, not from the reserve fund. The Committee recommends that "accident" should be expressed as "any disabling condition which was directly contributable to the workmen's occupation".

Panels of physicians had been set up to re-examine workmen who complained that their cases had not been properly dealt with. The investigation indicates it were better to have the cases dealt with by the workman's physician together with a competent specialist chosen by the Board.

Preparations are being made for the annual "refresher" course, as these have proved most popular with the members of the profession.

It is contemplated that there will be a convention in Calgary next fall, arranged as to dates, so that the officers of the Canadian Medical Association together with two or three clinicians will assist with the program.

G. E. LEARMONTH

Manitoba

The annual meeting of the Sanatorium Board of Manitoba was held in the Central Tuberculosis Clinic, Winnipeg, on February 23. Col. R. M. Simpson, M.D., was elected an honorary member of the Board.

In his annual report, Dr. E. L. Ross, Superintendent, showed that the death rate from tuberculosis in Manitoba per 100,000 population had decreased from 103 in 1911 to 43 in 1942. It was gratifying, he stated, to note that in the third year of the war, there was no rise in tuberculosis deaths in Manitoba. Referring to the presence in the province of 62 persons known to have tubercle bacilli in the sputum who are not in sanatoria, he thought that this situation could not be

improved until legislation regarding spreaders of tuberculosis infection was made more effective.

The provision of free tuberculosis treatment by the City of Winnipeg for Winnipeg residents was a very commendable action.

In 1942 x-ray surveys by miniature film were carried out on 4,000 people at the Cordite plant and 1,000 at Canada Packers, Limited. With additional equipment this very necessary work will be extended in 1943 by x-raying in a wholesale manner to as many people as possible in larger centres such as Dauphin and Portage la Prairie.

Dr. Ross pointed out that in Manitoba there are 2.6 beds for each tuberculosis death, a ratio which comes well within the standard set up by the Canadian Tuberculosis Association. In the past year a division of rehabilitation had been set up and was doing good work. An essential part of the campaign against tuberculosis is to keep the public informed about the disease.

Dynevor Indian Hospital, owned by the Department of Indian Affairs, and operated by the Sanatorium Board has completed its third year as a 50-bed sanatorium with a 90% occupancy.

Receipts for Christmas Seals were 22% over those of 1941. The Seal Fund has taken on an additional responsibility in the financing of the Division of Rehabilitation.

Since the opening of Manitoba Sanatorium in 1910 nearly 10,000 persons have had the benefit of treatment there. In chest surgery the volume of work in 1942 increased materially over that of 1941. No operative deaths occurred in the last year. The use of blood plasma lessened operative and postoperative shock.

Manitoba Medical Services, a health insurance scheme sponsored by the Manitoba Medical Association, advanced a step further when approval of the scheme was given by a general meeting of the medical profession recently.

At the 24th annual convention of the Icelandic National League of America held in Winnipeg, Dr. B. J. Brandson, emeritus Professor of Surgery, Manitoba University, was unanimously awarded honorary life membership in the league.

Dr. J. W. Dafoe, Chancellor of the University of Manitoba, delivered the fourth annual Dr. D. A. Stewart Memorial Lecture in the Manitoba Medical College on March 3.

A petition for a private act to incorporate the Manitoba Institute for Medical Education and Research was tabled in the Legislature on February 18.

The provincial board of directors named in the petition are: Dr. P. H. T. Thorlakson, Dr. Harry D. Morse, Dr. C. Burton Stewart, Dr. Lennox Bell, Dr. Sidney E. Smith, president of the University of Manitoba, Cecil S. Gunn, H. E. Sellers, W. A. Murphy and Dr. A. T. Mathers.

Plans for a health clinic were considered at a meeting of the newly-organized public health service in West Kildonan, February 18, at Centennial School.

Plans for a new $125,000 three-storey wing for Deer Lodge Hospital have been announced by Dominion government authorities. The new wing will include an enlarged operating clinic of the latest type, and the total cost including equipment is expected to be about $250,000. The wing will connect with the present western extension and will face toward Duffield Street. It will be of fire-proof reinforsed concrete construction with a red brick exterior. Work is expected to begin about the end of March.

The Faculty of Medicine of the University of Manitoba held a refresher course, February 24, 25 and 26. This course was given exclusively for the medical personnel of the three armed services, and dealt with subjects of special interest in military medicine. Guest speakers included Surgeon-Commander D. R. Webster, R.C.N.V.R., who discussed the prevention and treatment of injury to the feet by moisture and cold; Major Neil McKinnon, R.C.A.M.C., who spoke on "Meningococcal infections"; and Squadron-Leader A. W. Farmer, R.C.A.F., whose topic was the physiology, pathology and treatment of burns. The remainder of the program was given by members of the faculty of medicine and the local representatives from the medical services of the armed forces. This was the first course of this type to be held by any Canadian university.

ROSS MITCHELL

New Brunswick

Dr. H. A. Farris, Saint John, attended the meeting of the American College of Physicians at Boston and the American Heart Association meeting at New York last month.

Dr. I. DeV. Chipman, Saint John, was recently re-elected president of the New Brunsiwck Division of the Canadian Red Cross Society.

The executive committee of the New Brunswick Division of the Canadian Red Cross Society includes the names of Dr. J. E. Paulin, Tracadie; Dr. C. W. McMillan, Fredericton; Dr. Geo. Skinner, Saint John; and Dr. H. I. Taylor, St. George.

The regular monthly meeting of the Saint John Medical Society was held at the General Hospital on February 18, 1943. Lt.-Col. J. P. McInerney was the special speaker. He discussed, "Medical aspects of chemical warfare". This presentation was most interesting to a large audience and was illustrated by many charts and colour photographs. The second portion of the evening was devoted to a question and answer period on the question of Health Insurance. Dr. Geo. Skinner and Dr. A. S. Kirkland supplied what answers were available, the result of their attendance at the recent meeting of the Canadian Medical Association committee.

A second special meeting of the Saint John Medical Society gave the members an opportunity of viewing a number of films on medical subjects supplied by certain drug houses.

Dr. F. A. McGrand, of Fredericton Junction, is at present doing postgraduate study in upper Canada. This absence from home prevented Dr. McGrand's appearance at the opening of the New Brunswick Legislature of which he is the speaker.

It is reported that Major D. W. F. Porter is again proceeding overseas after a short tour of duty in Canada.

Dr. P. M. Knox, superintendent of the River Glade Sanitorium has been elected a fellow of the American College of chest physicians.

Recent enlistments in the R.C.A.M.C. include Dr G. A. Cloutier, of St. Leonards, and Dr. D. A. MacLennan, of Campbellton.

A preliminary report from the New Brunswick Division of the Canadian Medical Procurement and Assignment Board, presently engaged on a survey of medical man power indicates clearly that medical enlistments in M.D. No. 7, New Brunswick has reduced the number of physicians practising in the province to a point under the level of safety as laid down under present standards. It is also apparent that authority is needed to freeze doctors in their present locations and to reallocate others to regions where medical coverage is wanting.

A. S. KIRKLAND

Nova Scotia

Stressing the desirability of the greater use of tuberculin testing and x-ray examination, the 38th annual report of the Nova Scotia Sanatorium states: "There is great need of such examinations in these troublesome times, especially among the various industrial groups of men and women who, with the accelerated pace of their war-time jobs, nervous strain, longer hours of employment, and hazards to which they have not been accustomed, are liable to have their health undermined, and so pave the way for tuberculosis."

The Sanatorium had a total of 126,220 patient-days for the year. Despite a serious shortage in the staff, work has been kept to a safe standard, although not up to the requirements of other years, according to the report.

The problem of medical care on Nova Scotia's south shore, between Halifax and Hubbards, where there is no doctor, came before the provincial legislature in the reply to the Speech from the Throne.

Lieutenant-Colonel Victor Mader, M.D. (O), of Halifax, has been awarded the Canadian Efficiency Decoration.

After ardent verbal exchanges between Stellarton and New Glasgow, the Aberdeen Hospital Board has decided in favour of its original plan to build a 40-bed maternity pavilion instead of nurturing the hope of a new hospital in the near future.

Dr. W. A. MacQuarrie (Dal. '43), has gone to New Glasgow, where he is associated in practice with Dr. C. B. Crummey.

Dr. Charles N. Morehouse (Dal. '43) has opened an office in Maitland, busy rural centre which has been for several months without a physician.

The health of Cape Breton South is good, according to County Health Officer, Freeman O'Neill, in his annual report. During the past year there has been no smallpox, no diphtheria, and but few cases of scarlet fever. This he attributes to intensive immunization.

ARTHUR L. MURPHY

Ontario

The February stated meeting of the Academy of Medicine, Toronto, was addressed by Professor W. Ford Connell, of Kingston, on "Some aspects of rheumatoid arthritis". The speaker at the stated meeting for March was Francis Carter Wood, Professor of Cancer Research, Columbia College of Physicians and Surgeons, New York. His subject was "Surgery versus radiation in the treatment of cancer". These valuable papers will be published later.

Group Captain J. W. Tice has been appointed Director of Medical Services for the Royal Canadian Air Force. He succeeds Air Commodore R. W. Ryan of the R.A.F. who is returning to Britain. Group Captain Tice was, before the war, in charge of the Diabetic Clinic of the Hamilton General Hospital.

Major T. R. Sargeant, consulting surgeon to No. 15 Canadian General Hospital in England, was home for a brief furlough in February. He reports most favourably on the application of Truetta's principles in the treatment of compound fractures. The hospital met the emergency following the Dieppe raid with competence.

Owing to enlistments among the younger members of staff in the Faculty of Medicine, University of Toronto, Lt.-Col. Wansbrough, Lt.-Col. Cannell, Lt.-Col. Urquhart, Lt.-Col. Hyland and Major Stanley Campbell have been recalled from Canadian General Hospital No. 15.

Col. C. A. Rae was home for brief furlough in February.

Canadian General Hospital No. 13 is now being mobilized in Hamilton, Ont., under command of Lt.-Col. Leeming Carr. C.G.H. No. 18 under command of Lt.-Col. Abbott is mobilizing in Kingston, Ont.

Brigadier C. P. Fenwick is now D.D.M.S. of the First Army Corps overseas.

The scheme of enlisting students in medicine in their last two years in college makes graduation day of military as well as academic importance. At the convocations of the University of Toronto, Queen's and Western Ontario every male graduate who was physically fit was in uniform. Brigadier General Brock Chisholm D.M.S. addressed the graduating class in Toronto and Brigadier F. Logie Armstrong, O.B.E., addressed the class in Kingston.

M. H. V. CAMERON

Quebec

Le Dr Wilbrod Bonin a été nommé titulaire d'Histologie et d'Embryologie à la Faculté de Médecine de L'U. de Montréal.

Le Dr J. U. Gariépy a été nommé chirurgien-en-chef de l'hôpital Notre-Dame de Montréal; il succède au Dr B. G. Bourgeois récemment décédé.

Le Dr Paul A. Bélanger, président du Bureau Médical de l'Hôpital Ste-Jeanne d'Arc vient d'être nommé surintendant médical de cet hôpital; il succède au Dr C. A. Décary.

A l'hôpital du Sacré-Cœur de Cartierville, les élections récentes ont donné le résultat suivant: Au Bureau Médical; Président, Dr Yvon Laurier; Vice-président, Dr Ls. Verschelden; Sec. Trés., Dr J. P. Paquette. Au Conseil Médical; Président, Dr J. E. Samson; Vice-président, Dr G. E. Mignault; Sec. Trés., Dr Yvon Laurier.

Le Dr Jean LeSage a été élu président de la Société de Gastro-Entérologie de Montréal.

JEAN SAUCIER

Saskatchewan

A special meeting of the Saskatoon and District Medical Society was held in a down-town dining hall, on February 23rd, at which Dr. Jack F. C. Anderson, and Dr. J. A. Valens, gave an account of the recent Canadian Medical Association Conference, held at Ottawa, on "Health Insurance". They mentioned some of the problems which would arise in the setting up of a Dominion-wide Health Insurance Scheme.

H. D. HART

General

War Conference on Problems of Wartime Production.—The medical, surgical and industrial hygiene experts who are so ably safeguarding the well-being of more than 20 million industrial workers have agreed to pool their knowledge and exchange their experiences regarding the many new and complex problems of today's wartime production. For this purpose their organizations: The American Association of Industrial Physicians and Surgeons; the American Industrial Hygiene Association, and the National Conference of Governmental Hygienists are combining their annual meetings in a four-day "War Conference" at Rochester, New York, May 24 to 27, 1943. Among the problems to be discussed from a practical standpoint are:

The mass entry of women into industry; older-age employees, with their various associated problems; proper placement and employability considerations of the 4F rejectees; rehabilitation and proper employ-

ment of those already discharged from the military services because of disabling conditions; toxic and other hazards from new substances, new processes, and the use of substitute materials; absenteeism; fatigue; nutrition; effects of long hours; double shifts; two-job workers; overtime; increased industrial accident rates; advances in the treatment of illnesses and injuries, and many others.

This joint meeting will be a report on the state of the nation, by the men who know, in matters of industrial health. Dr. William A. Sawyer, Medical Director of Eastman Kodak, is General Chairman; Dr. James H. Sterner and Lieut.-Com. J. J. Bloomfield are arranging the programs for the industrial hygienists.

Physicians and surgeons, hygienists, engineers, nurses, executives—all who are interested in the problems of industrial health and their solution—are invited to attend as many of the sessions as they can arrange for; no registration fee is required.

Survey of Public Health Personnel

Most sections of Canada are under-staffed with public health personnel, Dr. J. J. Heagerty, Health Services Director of the Department of Pensions and National Health, has announced. He pointed out that "public health personnel have been depleted too rapidly by enlistments and all provinces except Prince Edward Island and Quebec are below the minimum of personnel considered absolutely essential."

Dr. Heagerty emphasized that "there always is the possibility of a serious outbreak of disease" if public health staffs are so depleted they are unable to do essential work. Such necessary duties include testing and chlorination of water services to urban populations, sanitary inspections, supervision of milk supplies, and control measures to prevent the spread of diseases such as the measures taken in the west to detect and control bubonic plague and Rocky Mountain spotted fever, which have been reported in southern Alberta.

"The public health committee of the Canadian Medical Procurement and Assignment Board is making a survey to ascertain the absolute minimum requirements of public health personnel as part of the Board's nation-wide health survey," he said. "When we have completed the survey, we may be able to act on recommendations being made that public health doctors, nurses and other personnel be frozen in their jobs and that provision be made to place them in special identifying uniforms or to give them buttons indicating they are serving their country in indispensable posts. Dr. Fred Jackson, of Winnipeg, Deputy Minister of Health for Manitoba, is in charge of the public health survey for the four western provinces; and Dr. John Phair, of Toronto, Chief Medical Officer of the Ontario Department of Health, is in charge in the central and eastern provinces.

"Nova Scotia is in a bad state due to the war", said Dr. Heagerty. "In the provincial hospital for mental diseases with 500-bed capacity, the only medical man on the staff is the medical superintendent. The Rockefeller Foundation survey showed that Halifax's death rate has risen from 14.5 in 1937 to 17.2 in 1941 and is almost 45% higher than for the rest of Nova Scotia.

"New Brunswick had ten health districts with eleven medical health officers, but has lost five of these physicians and had had to merge several districts which means doubling up the work and cutting efficiency. Prince Edward Island has had little reduction; not one of its three medical men and staff of 12 was eligible for military service.

"The shortage in Quebec is comparatively slight but in Ontario the shortage has been so very great in every field that it has become necessary for one health officer to do the work of two. It also has been necessary to train health nurses to do work formerly done by medical officers, such as blood testing, and so on.

"The reduction in Manitoba has not been so great, but the demand on the health services has been greatly increased due to the war. In Saskatchewan the enlistment of rural men has been very heavy. In Alberta only five health officers are left of the nine who looked after the nine different health units. Nurses in outlying districts of Alberta are giving medical treatment because there are no doctors, even in adjacent areas. By December of last year 212 physicians had left Alberta since the outbreak of war; there are three hospitals in Alberta with no doctor left in the immediate district, one of them may have to be closed because the nearest doctor is forty miles away. The situation in British Columbia is also very bad in the outlying districts."

Dr. Heagerty said the pressure on public health services will increase in the spring as melting snows from farms and city streets carry pollution into streams from which drinking water supplies are drawn. Instead of daily checks on chlorination needs, hourly and half-hourly checks on water supplies will be necessary in the spring. The Dominion Government took over such chlorination work in the Halifax and Vancouver districts because of the presence of troops.

Public health personnel have continued trapping squirrels and gophers in southern Alberta to check on the spread from United States western regions of bubonic plague carried by fleas on rodents. The situation is helped by the fact that the westward spread of rats from the east has not yet infested Alberta to provide more carriers. Where plague-carrying rodents are trapped, the burrows of surrounding areas are filled with poison gas. The bubonic plague has been spreading north since infected rats aboard an Orient ship entered San Francisco in 1900 and escaped from that city's sewers in the 1906 earthquake. Control measures have been taken also in the west against the Rocky Mountain spotted fever, spread by ticks which transmit a virus; and also against other transmittable diseases across the country.

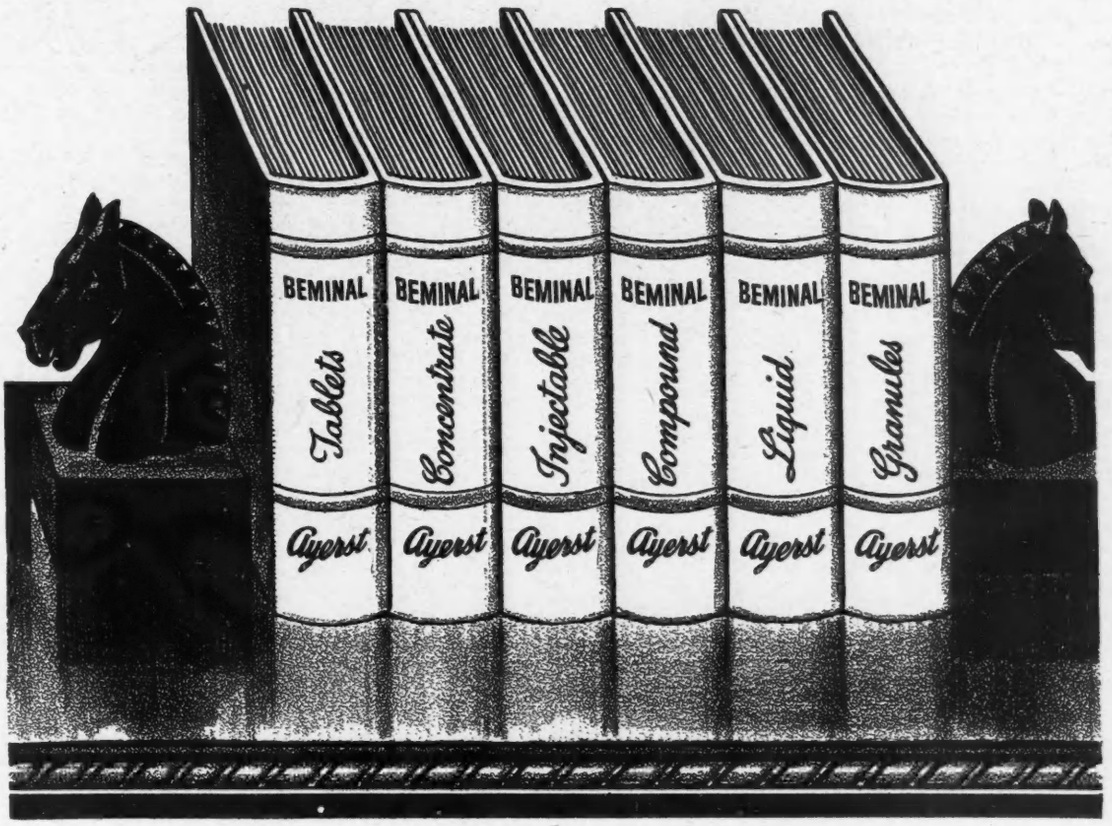
"When things go well, the work of public health departments is not noticed, but its necessity cannot be over-emphasized either in war or peace times," said Dr. Heagerty. "Right now our work is not being done so well as it should; it is a matter of not having enough personnel." Dr. Heagerty said that the national survey undertaken by the Board in all phases of health is intended to help meet the problem of distribution of health—all health personnel—physicians, dentists, nurses, and laboratory workers.

Early in 1942 the Canadian Committee on Sugar Analysis decided to offer a prize of $25.00 "for the best original scientific essay relating to the production, analysis, or uses of sugar or sugar products". Mr. G. R. Maybee, F.C.I.C., F.C.S., Chairman of the Committee, and Chief Chemist to Fry-Cadbury Ltd., has announced that the winner of this competition is Mr. Jean Savary, a graduate student in the Laboratoire de Biochimie, Laval University, Quebec. The title of Mr. Savary's winning essay is "Methode de Dosage des Sucres Reducteurs au Spectrophotometre".

The prize was presented to Mr. Savary in person at the seventh annual meeting of the Canadian Committee on Sugar Analysis held on February 19th.

The Executive Board of the **American Public Health Association** announces that the Association will sponsor a three-day Wartime Public Health Conference in New York City, October 12th to 14th. The 72nd Annual Business Meeting of the Association will be held in connection with it. The Conference program will be devoted exclusively to wartime emergency problems as they affect public health and the public health profession.

American Board of Ophthalmology 1943 examinations will be held at New York city, June 4 and 5; Chicago, October 8 and 9. Candidates will be required to appear for examination on two successive days. Please write at once for formal application blanks. Dr. John Green, Secretary, 6830 Waterman Avenue, St. Louis, Mo.



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Book Reviews

Les Tendances Eugenistes au Canada. H. Balis. 198 pp. L'Institut Familial, 2080 Dorchester St. West, Montreal, 1942.

This book, written by a French doctor of Theology in a Catholic seminary, states in its introduction that its aim is to interpret a new problem (that of eugenics) in the light of the traditional principles of the Catholicism. The definition of eugenics, the fundamentals of hereditary transmission, the biological and social facts relative to eugenics, the prenuptial medical examination, the impediments to marriage because of infirmities, the question of sterilization, and the laws enacted so far in Canada concerning this question form the first two sections of the book. The third section deals with the Catholic opinion on eugenics, and is the traditional exposition of the position of the Catholic Church. The epilogue states that so far Canada has presented only the negative side of eugenics, namely the elimination of those with undesirable hereditary traits; it has not emphasized the positive aspect, that of enabling the family to develop normally. His final conclusion is that if the eugenic dream is to be realized, society must protect the sanctity of the family, and this must be done under the spiritual control of the Catholic Church.

Surgical Pathology. W. Boyd. 5th ed., 843 pp., illust. $11.50. Sanders, Philadelphia; McAinsh, Toronto, 1942.

There is little to be added to what has been repeatedly said as to the excellence of this textbook. One would like to be assured, perhaps, that its fifth edition presents the most recent additions in this pathological field, and that assurance may be readily given. There is a new chapter on Surgical Pathology of the Thorax and much revision of chapters on the Nervous System and the Female Reproductive System. Numerous minor changes have been made in the existing material. The illustrations retain their high degree of excellence.

War Injuries of the Chest. Edited by H. M. Davies and R. Coope. 131 pp., illust. $1.75. Livingstone, Edinburgh; Macmillan, Toronto, 1942.

The aim of this little book is to tell the general surgeon, who must deal with casualties, all he has forgotten or did not know about chest injuries, to tell him succinctly and yet with practical detail. The list of contributors is long and distinguished. Whether each has cultivated, for this work, the same style, or whether credit for the book's direct approach goes to the editors, the result to the reader is the same. Small, limp, rounded covers, well indexed, with informative chapter headings and simple diagrammatic sketches, it is a book he can slip from his pocket for study under almost any conditions.

Physiology and pathology of the respiratory apparatus are practical in presentation and lead to general clinical considerations, and the diagnosis and therapy of the particular injuries. Special stress is laid upon primary treatment, often of vital importance in chest injuries, and the techniques for dealing with massive lung collapse, from its various causes, are given in excellent detail. Major operative procedures receive briefer attention, and direct trauma to the heart and pericardium are given only a scant place, the authors stating that such wounds are usually fatal. To the medical officer this book is of great value, and it will fill a gap on the bookshelves of many general surgeons in civilian practice.

Blood Substitutes and Blood Transfusion. Edited by S. Mudd. 407 pp., illust. $5.00. Thomas, Springfield, Ill., 1942.

This is a specialist's book in the main, written by men who are distinctly specialists in their line, and whose names in the list of participators in this work form a cross-section of the laboratory workers of North America. This is not to say that there is nothing in this book for the man in practice—on the contrary, there is a great deal. The latest work on plasma, the modern treatment of shock, the lessons learned so far in the war, the relation of the sulfonamides to blood transfusion—these and other matters which confront the practitioner every day are here carefully discussed and evaluated.

Technique receives a great deal of attention, and there are full bibliographies at the end of each chapter. This book should prove of great value to the small hospital and independent laboratory worker, and to those doctors who maintain their own laboratories in connection with their offices. Details of apparatus and methods are especially fully given and adequately illustrated. The whole field of serotherapy and plasma therapy is thoroughly covered, and the book is completely up to the minute.

An interesting feature is the form of the book. It is described as a symposium-monograph, and is really a collection of symposia in each of which many men take part. This tends to thoroughness of discussion, and makes the work interesting to read. We believe that this book meets a need, and will be found a most useful addition to the medical bookshelf.

Advances in Internal Medicine. Vol. I. Edited by J. M. Steele. 292 pp., illust. $4.50. Interscience Publishers, New York, 1942.

This book is designed to give the reader intimate knowledge of recent advances in medicine. It is divided into sections, by different authors, dealing with insulin and diabetes, the use of the Miller-Abbott tube, the peripheral vascular system, the sulfonamides, infections of the genito urinary tract, studies of epidemic influenza, hypertension, nephrosis and riboflavine deficiency.

The section on diabetes is of real value. The author's views on protamine zinc insulin will not be subscribed to by some readers, but they are definite, practical and, in his experience, satisfactory. No detailed consideration of diet is given, but an effort to approximate the normal is stressed. Fallacies in the testing of urines are pointed out.

The Miller-Abbott tube is dealt with in detaill. Its uses, tricks in successful introduction, dangers and failures, are clearly described. Two sections are devoted to the sulfonamides, the one dealing with their chemistry and antibacterial action, the other with the choice of drug in specific infections.

Hypertension is dealt with at length. This is largely a review of recent theory and experiment in etiology and treatment. The limitations of surgical treatment are made obvious and thiocyanate therapy discussed.

Most Canadian readers will wonder from what source American writers draw their wealth of vitamin deficiencies, particularly the various fractions of the B-complex, immense quantities of which are hopefully prescribed by physicians who have not seen a deficiency yet. However the various signs and symptoms of riboflavine deficiency are pointed out and perhaps wider recognition will follow perusal of this section. The book is well worth reading.

Nutrition and Chemical Growth in Childhood. Vol. 1, Evaluation. I. G. Macy. 432 pp., illust. $5.00 Thomas, Springfield, Ill., 1942.

This book is based on a series of extensive studies made by Dr. Icie G. Macy and her associates under the auspices of "The Children's Fund of Michigan". It is concerned with the metabolism of normal children living under controlled conditions which approached as closely as possible the environment, habits, nutrition, and the life in general of an average child. The data thus accumulated are extremely valuable, especially as a basis of comparison for other investigators who are confronted with the problems of abnormal nutrition and to whom the collection of sufficient control data would represent an enormous problem.

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Dr. Macy has presented in detail the method of investigation and technique of performing metabolic balance studies. This is an important feature and it again emphasizes the fact that the "intake" in any balance study must be accurately analyzed and not obtained by calculation from tables giving average results of food analyses. The use of such tables has led to a great deal of misinformation, and such studies are worthless.

In addition the book contains chapters on the physiological and chemical aspects of digestion and excretion, energy metabolism, hæmatochemical studies and metabolic balances. There is also a chapter describing the methods of chemical analysis. The latter could possibly have been left out of a book of this type. However, it serves to complete in detail the necessary procedure for a metabolic study.

This book is recommended to the investigator who is interested in the fundamental nutrition of children and should be a valuable book for the general practitioner.

Sulfanilamide and Related Compounds in General Practice. W. W. Spink. 2nd ed., 374 pp. $3.00. Year Book Publishers, Chicago, 1942.

This book fills a valuable place in the library of any physician. The subject is covered admirably and in a well arranged manner, starting off with a general consideration of the sulfonamides and going on to their place in the treatment of the various diseases. The book is rounded out by chapters dealing with local, prophylactic, dermatological and dental uses of the compounds, and the final chapter is given over to a clear discussion of toxic manifestations. This book is highly recommended for use by any practising physician.

Introduction to Medical Science on a Basis of Pathology. C. G. Darlington and G. G. Appleton. 446 pp., illust. $3.25. Lippincott, Montreal, 1942.

This book was written primarily for nurses and has been planned to bridge the gap between basic science instruction and the clinical work. Medicine is discussed from the angle of pathology. There are three parts to the presentation. Part One reviews the causes of disease, its manifestation in the body, diagnosis, treatment and control. Part Two covers the pathology of disease according to systems, and Part Three gives the more important clinical laboratory procedures. There are many helpful illustrations, diagrams and tables. The review exercises are "catchy" with true-false, completion and matching tests. Though foreign to the scientific mind, we can see their value in teaching the over-tired pupil nurse. The work is a practical and useful one, though we cannot see the value of fourteen pages of bibliography to the nurse.

Nasal Medication. N. D. Fabricant. 122 pp., illust. $3.00. Williams & Wilkins, Baltimore; University of Toronto Press, 1942.

So far as the reviewer is aware this is the only book published on the subject of nasal medication. One feels as though he were reading a series of articles since each chapter has an extensive bibliography at the end. About five times as much space is given to histopathology and physiology as is given to anatomy. The mucous membrane and the natural defences of the nose are given a prominent place and the author predicts that the solution of the common cold problem probably rests in further studies of the nasal secretions. The pH of the nose is normally acid and organisms do not grow well in that medium. This can be changed to alkaline by fatigue, chilling or by medication and many organisms grow better in this alkaline medium. In choosing any drug for nasal medication its pH is more important than its isotonicity. Its action on the cilia and mucous membrane should also be known since it may do definite harm. A solution of 0.9% sodium chloride and 1 to 2% ephedrine is relatively safe. The oils which have enjoyed such a high place in normal medication are relatively harmless but burden the cilia and may cause lipid pneumonia. Escharotics, zinc ionization, and even the electric cautery, may be useful at times but should be used with great care. Various methods are described for nasal medication, some requiring as much technique as a major operation. These ceremonial procedures seem to be a bit overdone in the treatment of self-limited diseases.

The work will prove valuable to the oto-laryngologist and general practitioner as well.

Roentgen Treatment of Diseases of the Nervous System. C. G. Dyke and L. M. Davidoff, 198 pp., illust. $3.75. Lea & Febiger, Philadelphia; Macmillan, Toronto, 1942.

This is a book which is really needed in medical literature as a study of the place which radiation has in the treatment of diseases of the central and peripheral nervous system. The authors' experience is limited to the use of x-ray therapy. The experimental effect of radiation on normal nervous tissue, based on clinical and often histological findings, is discussed, both with the use of radium and roentgen rays. The effect of radiation on pathological processes affecting the nervous system is obviously the main object of the book. An extensive survey of the literature on the effect of radiation and the results of treatment in brain tumours is presented. The techniques used for treatment of various types of tumours by the authors and some radiologists from the various large neuro-surgical centres in the United States, are described at length. In general, Dyke and Davidoff use rather conservative doses in any single series of treatment, repeating such series to their optimum total dose varying between 5,000 and 10,000 "r". Their experience and results in the treatment of the various brain tumours are interesting and well presented. The favourable effect of radiation on pituitary adenomas, medullo-blastoma and some gliomas of the optic chiasma is unquestionable.

Spinal cord tumours, intra- or extramedullary, are the subject of considerable study. The response to radiation in some of them, especially the intra-dural varices and extra-dural sarcoma, is surprisingly good.

Finally a discussion as to the effect of radiation in miscellaneous non-tumorous conditions of the nervous system has also been included in this altogether excellent monograph. In this too Dyke and Davidoff have contributed something new to medical literature. This book should be in the hands of any one who is interested in treatment of diseases of the nervous system.

Microbiology and Man. J. Birkeland. 478 pp., illust. Williams & Wilkins, Baltimore; University of Toronto Press, 1942.

Ainsi que le marque l'auteur, comme sous-titre, ce livre est un compte rendu des caractères et propriétés des microorganismes, une description de l'outillage et des méthodes qui servent à les étudier, et une enquête sur leurs rapports avec la vie de chaque jour.

Le livre qui comprend 478 pages, est divisé en quatre chapitres: principes fondamentaux de microbiologie, au début duquel, l'auteur fait, en guise d'introduction, une sorte d'historique du développement de la microbiologie; infection et résistance; maladies infectieuses communes; microbiologie des ailments, du lait, de l'eau, des curures et des sols. Le tout se termine par un glossaire, une liste des références et un index alphabétique.

Ce livre, qui peut servir excellemment comme précis de pathologie générale en rapport avec la bactériologie, a été fait pour l'étudiant. Je ne saurais trop le recommander aux éléves en médecine de première et de deuxième année, ainsi qu'aux médecins, qui y trouveront facilement d'innombrables faits, présentés d'une façon compréhensive et assez concise.

L'auteur a eu le souci d'expliquer les faits et phénomènes, et non pas simplement de les énumérer. C'est un livre didactique au plus haut point, qui devrait être entre les mains de tous les étudiants qui se destinent aux disciplines de la biologie en général, et de l'hygiène publique en particulier.

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MANUFACTURING CHEMISTS TO THE MEDICAL PROFESSION SINCE 1858

Fundamentals of Psychiatry. E. A. Strecker. 201 pp., illust. $3.75. J. B. Lippincott, Montreal, 1942.

This textbook deals with the field of Clinical Psychiatry in a brief, authoritative and readable style. The last chapter that deals with psychiatry during wartime and psychiatric casualties, will be helpful to medical officers. The author's experience in the last war, as well as preparing a practical manual in psychiatry for use in this war, is evident. Dr. Strecker has succeeded in condensing a great deal of psychiatry within the two hundred pages. Fifteen diagrams are used to illustrate points in psycho-pathology.

The author has clearly defined the aims of this book, as follows:

"The logical conclusion is inescapable. Each doctor, whether he is a medical officer or remains in civil life to give medical aid to the noncombatant population, must needs acquire a minimum of psychiatric information and skill."

In the reviewer's opinion, this book fulfils the function very well.

Cancer of the Uterus. E. Hurdon. 188 pp., illust. $5.25. Oxford University Press, London; McAinsh, Toronto, 1942.

Dr. Hurdon's book forms a fitting culmination of her long years of work and demonstrates not only her own intimate knowledge of the subject but also the importance of unselfish collaboration among a group of workers in the handling of the cancer problem. The book begins with a chapter on carcinoma in general, particularly as to its incidence, nature and predisposing causes. An interesting point noted is the rise and fall of incidence rates of breast and uterine cancer in relation to fertility and social status. To quote:

"The death rate of cases of cervical cancer is lower in single women and progressively increases among married women on descending the social scale; whereas breast cancer presents exactly the opposite relation with regard to the marital connection and social class."

The treatment of cervical cancer is discussed in great detail, together with the operative and post-operative complications. There is an analysis of 1,296 cases, examined with a view to treatment and also an evaluation of results. Treatment of cancer of the fundus is also discussed and there are chapters on cancer of the vagina, the vulva and the cervical stump following subtotal hysterectomy. There is a chapter on cancer of the cervix in pregnancy and this includes an interesting review of the literature on that subject.

Other problems are touched upon, such as endometriosis and the radiation treatment of uterine hæmorrhage in non-malignant disease. The author points out that it is now generally recognized that histological grading of cells is valueless in estimating tumour sensitivity or prognosis with respect to the results of radiotherapy. The noted American pathologist, Dr. Ludvig Hektoen, made the same statement at the last Radiological meeting in Chicago. She also stresses the importance of lay education and advocates the establishment of treatment centres of the sort envisaged by Dr. Richards, of Toronto, in his recent memorandum on cancer.

This book is of special interest to gynæcologists and could be read with profit by every general practitioner. It is carefully produced, well illustrated and has an excellent bibliography. It is, indeed, an important contribution to the common war against cancer.

A Handbook on Diseases of Children. B. Williamson. 3rd ed., 364 pp., illust. $3.75. E. & S. Livingstone, Edinburgh; Macmillan, Toronto, 1942.

The general impression of this is that of a book on adult medicine whittled down to a near uselessness. The descriptions of the various diseases are poorly presented and do not give a true picture of the conditions. Too much attention is paid to heart diseases and to diseases of the thorax and the nervous system. There is no comparative physiology, and growth and development are not given their proper share of space. The acquired functions are slurred over or else interpolated here and there throughout the book as to be easily missed. Basal requirements of the infant and child are not mentioned. The chapter on feeding is so vague as to be next to useless to a student. The therapeutics is English in pattern; many drugs are mentioned, but the indications for their use are vague and too generalized. Diseases of the new-born are not given particular attention and prematurity is given scant treatment, so sketchy as to be of no help at all.

The volume, of course, has good points, but it would seem that the author has tried to crowd too much into his little book, and in his efforts has lost his perspective.

The Hæmorrhagic Diseases and the Physiology of Hæmostasis. A. J. Quick. 340 pp., illust. $5.00. Thomas, Springfield, Ill., 1942.

In the words of the author the purpose of this monograph is to present and to correlate the experimental and theoretical aspects of hæmostasis and to summarize the present knowledge concerning the important hæmorrhagic diseases.

Chapter I is a brief discussion of the general aspects of the coagulation mechanism. Chapters II to VI deal separately with each of the various constituents of blood concerned in the coagulation of blood. In another chapter the various anticoagulants are discussed. Subsequent chapters are devoted to the clinical aspects of the problem. Thrombocytopenic purpura hæmorrhagica, pseudo-hæmophilia, telangiectasia, hæmophilia, avitaminosis, obstructive jaundice, biliary fistula and liver damage are among the diseases which come under critical analysis. Finally, the author has included an appendix which gives the technical details of the many laboratory tests employed to determine abnormalities in the clotting mechanism. The book is inclusive yet concise, detailed, though easily readable. It covers the subject exceedingly well and has an excellent bibliography.

Diseases of the Liver, Gallbladder and Bile Duct. S. S. Lichtman. 906 pp., illust. $12.65. Lea & Febiger, Philadelphia; Macmillan, Toronto, 1942.

"Even before Claude Bernard, Bichat suspected the liver to have functions other than the secretion of bile. He believed that 'nature would not have made the organ so large to produce a secretion less abundant than urine'." This quotation, from the first page of the text, has proved to be so true that we now see a competent authority restricting parts of his subject in order to confine the whole of it within the bounds of a single large volume. On the other hand, if our knowledge of the liver and of its diseases were even more complete this volume might be smaller for then one paragraph of fact would be able to replace several pages of theories. But a beginning has been made and the author must be congratulated. He says ten years of intensive investigation went into preparation for writing the book. The text certainly gives evidence of a great deal of hard work.

The microscopic anatomy and the physiology of the liver occupy the first hundred pages. The important rôle of nutrition and diet in liver function and damage is given early emphasis, and later the importance of diet and nutrition is fully considered in a chapter on the general treatment of liver disease. A long section is devoted to the large number of liver function tests and a consideration of their value. Accounts of all diseases and drugs as they primarily or secondarily affect the liver are presented in detail. The description of cirrhosis has an important place, and the sections dealing with the liver in hyperthyroidism and in the storage diseases are of particular interest.

Diseases of the gall bladder and bile ducts have a separate section at the end, again preceded by descriptions of anatomy and physiology. This part is written in less detail and is of less value because the information it contains, especially its surgical aspect, is easily found elsewhere.

This volume should be well received among internists. If the author would now reduce it to one-quarter size, omitting all references in the text, deleting the section on gall bladder and bile ducts and adopting a more readable style, he could produce a book which is needed and which would have a wide appeal to the whole profession both students and practitioners.